SITE SELECTION PROCESS.
PHASE 4A: SELECTION OF A PREFERRED SITE(S)
- Agriculture
Appendices

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September 24, 1985

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APPENDIX A

PHASE 4A FACTOR SHEETS

1.0 INTRODUCTION

The purpose of this appendix is to define and provide the rationale for each agricultural resource factor. Information is presented in a standard format on factor sheets. An overview at the beginning of each factor sheet identifies the factor, factor grouping and study area as well as the waste treatment facility components associated with that factor. Then a checklist identifies the options where the factors were applied. The factor is defined and its significance in the selection process is explained under the heading "Rationale/Significance." This outlines the relationship between the factor and expected project impacts. Next there is a general description of the factor's application and its relationship to other factors in the `Interpretation´ section. The factors discussed in this Appendix are those which fall within the factor grouping, "Agricultural Resources," in the site selection report (M.M. Dillon, 1985a).

Following the overview section for each factor there are more detailed descriptions of the indicators used in the analysis. Indicators are sub-sets of factors which define specific aspects of the environment which could be affected. Where possible, they are defined (measured) quantitatively.

Each indicator has a separate section on the factor sheet. The indicator is identified and defined and its rationale or significance to the comparative evaluation process is outlined. The methodology for analysis is also described. This includes an identification of the study area to which the indicator is applied, a discussion of data sources, including inputs from other consultants, assumptions and limitations.

The summary statements about methodology in the factor sheets are intended only to provide the reader with an overview of data sources, procedures and assumptions. More detailed discussions of methodology are found in Appendices B and C.

2.0 FACTORS FOR THE EVALUATION OF COMPONENTS

Factor sheets were prepared for the analysis used to select the preferred components of each siting option. These have been compiled for the refinement of site boundaries, access roads, (Preliminary and Phase 4A analysis) rail options (constraint mapping and comparative evaluation) and the location for the physical/chemical treatment plant for partially integrated options. The factors and indicators used for this purpose are outlined in Table A-1. Study areas referred to in the factor sheets for components are defined as follows:

REFINEMENT OF SITE BOUNDARIES	- Certain initial site acquisition areas were larger than necessary for accommodating the facilities. Consequently, the area within the site acquisition areas were examined in more detail and a refinement of site boundaries was undertaken to reduce the site size.

TABLE A-1

FACTORS AND INDICATORS FOR THE EVALUATION OF SYSTEM COMPONENTS

STUDY OPTION	STUDY AREA	FACTOR	INDICATOR
Refinement of Site Boundaries	site	Soil capability	
		Farms with headquarters	
		Cropland	
Access Roads Preliminary Phase	access roads	Active farm complexes	
		Farm complexes with livestock	
		Soil capability	
		Sensitive crops	
Access Roads Phase 4A Analysis	access roads	Loss of land	
		Farm machinery movements	
		Number of customer stops	
		Number of service vehicle stops	
		Area of cropped land within 800 m	
		Livestock/poultry housed	
		Cattle Crossings	

TABLE A-1 - cont'd

FACTORS AND INDICATORS FOR THE EVALUATION OF SYSTEM COMPONENTS

STUDY OPTION	STUDY AREA	FACTOR	INDICATOR
Rail Access Options			
. Constraint Mapping	rail corridor	Proximity to farm buildings	
		Severance of farm parcels	
		Cropland	
. Comparative Evaluation	rail options	Loss of farmland	
		Disruption to existing farm operations	. severance of farm parcels . proximity to farm buildings . amount of cropland in corridor
Location of Physical/Chemical Treatment Plant	vicinity	Disruption of existing farm operations	. number of farms with headquarters in the vicinity
	vicinity	Disruption of agricultural community	. percent of land in non-farm uses . percent of farmland that is owned . percent of farmland in parcels >12 ha
	access roads	Disruption of existing farm operations	. number of farms with headquarters . agricultural vehicle impact index

ACCESS ROADS - Alternative access roads extending from the site entrance to the closest 400 series highway were identified (Chapter 3). Regional access roads are those managed by the province or regional governments while local access roads are managed by local municipalities. Study areas pertaining to these access roads include farmed parcels of land abutting the roads and all farmlands within an 800 metre zone on either side of the road.

RAIL OPTION - Spur line alignments extending from the site to the nearest main rail line were identified (see Chapter 4 for discussion of railroads). Study areas associated with these include a 250 metre impact zone on either side of the rail line and a 18.5 metre right-of-way.

VICINITY - In the analysis of the location of the physical/chemical treatment plant for partially integrated options, the vicinity included all farm properties between the site and a distance of approximately 2 km from the site centre.

The factors used in the preliminary Phase 4A analysis of access roads are included. Since the factors used in the comparison of access road options are similar to those used in the comparison of siting options, they are described on the same factor sheets.

3.0 FACTORS FOR THE DETAILED COMPARATIVE EVALUATION OF SITING OPTIONS

For the comparison of siting options, factors were selected which describe the components of the agricultural production system which are vulnerable to impact from the waste treatment facility. These were subdivided into indicators, and in some cases sub-indicators (Table A-2).

Study area referred to in the factor sheets are described as follows:

SITE - The land area that would be acquired to accommodate waste management facilities including various combinations of a landfill operation, a physical/chemical treatment plant, an incinerator, administrative buildings, shipping and receiving, buffer areas, etc.

VICINITY - An impact area in close proximity to the site included:

Adjacent Farms - all farm properties which abut the site, are immediately across the road from the site, or are separated from the site boundary by only a very small property.

Non-Adjacent Farms - all farm properties between the adjacent farms and the limit of the vicinity study area (approximately 2 km from the site centre).

COMMUNITY - An area extending beyond the site vicinity may be affected by the site facilities if changes occur in the character of the local agricultural community in a social and/or economic sense. Since the dimensions of such a zone are very difficult to delineate, a regional "community" zone was arbitrarily defined as extending 5 km from the site centre. A local community zone was defined as the area covered by the "Walk and Talk"

TABLE A-2

FACTOR/INDICATOR/SUB-INDICATOR FOR THE DETAILED COMPARATIVE EVALUATION

STUDY AREA	FACTOR	INDICATOR	SUB-INDICATOR
Site	Displacement of Farms with On-Site Headquarters	. no. of farms with on-site headquarters	. no. of operations owned . no. of operations rented
		. average size of farms	. hectares owned . hectares rented
		. estimated gross farm revenue	
Site	Loss of Farmland	. soil capability . tile drainage	
Vicinity	Partial Displacement of Farms	. no. of farm operations affected . average size of lost parcels	
		. proportion of land base lost	. proportion owned . proportion rented
Vicinity	Disruption of Adjacent Farm Operations	. no. of farm operations with headquarters . no. of operations with owned land . livestock density	
Vicinity	Disruption of Non-Adjacent Operations	. no. of farms with headquarters . proportion of land in crops . livestock density	
Community	Stability of Farm Population	. age of operators . full-time operators (% of total operators)	

TABLE A-2 - cont'd

FACTOR/INDICATOR/SUB-INDICATOR FOR THE DETAILED COMPARATIVE EVALUATION

STUDY AREA	FACTOR	INDICATOR	SUB-INDICATOR
Community	Stability of Agricultural Land Base	. land tenure	. proportion of land in large parcels . proportion of owned farmland . proportion of area farmed
		. farm residences (percent of total residences)	
		. agriculturally designated land	
		. private land ownership	
Region	Disruption to the Farm Economy	. gross farm revenue	
		. relative crop and livestock exposure to fugitive emissions	. livestock index . crop index
		. relative crop and livestock exposure to stack emissions	. livestock index . crop index
		. exposure of downstream livestock	
Access Roads	Disruption to Farm Traffic and Cattle Crossings	. local roads	. agricultural vehicle impact index . no. of customer/ service vehicle stops . cattle crossings
		. regional roads	. agricultural vehicle impact index . no. of customer/ service vehicle stops . cattle crossings
Access Roads	Disruption to Crop and Livestock Production	. adjacent crops . adjacent livestock . downstream livestock	

survey of local residents (Appendix B). This area is slightly larger than the vicinity area described above and extends to approximately 2 km from the site centre. Both zones include on-site properties.

AIR DISPERSION ZONES	- Atmospheric emissions will be produced from an incinerator and from other on-site facilities. For the purposes of comparative evaluation of potential air emission effects on crops and livestock three circular zones were defined around each site, 0 to 2 km, 2 to 5 km and from 5 to 20 km. These are centered on the incinerator stack location.
ACCESS ROADS	- Alternate access roads extending from the site entrance to the closest 400 series highway were identified (Appendix D). Regional access roads are those managed by the province or regional governments while local access roads are managed by local municipalities. Study areas pertaining to these access roads include farmed parcels of land abutting the roads and all farmlands within an 800 metre zone on either side of the road.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Soil capability.

STUDY AREA: Site Acquisition Area

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
		X
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: The Canada Land Inventory (CLI) soil capability class for growth of common field crops.

RATIONALE/SIGNIFICANCE OF FACTOR: This factor identifies soils best suited to continuous cultivation of common field crops.

INTERPRETATION: For boundary refinement purposes, the capability classes of the soils maps prepared from the on-site soil survey were generalized according to the dominant class. Where no particular rating dominates an area, a composite rating was indicated (e.g. Classes 1-3). The boundary of these generalized units were marked on 1:10,000 scale working maps and assigned relative constraint levels. Class 1 and 2 soils were considered a major constraint, soils grouped as Class 1-3 and 2-3 were of moderate constraint, and soils grouped as Class 3-2 or 3 or lower were considered as little or no constraint.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Farms with headquarters.

STUDY AREA: Site Acquisition Area

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
		X
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**

DEFINITION OF FACTOR: The number of farms with headquarters on the property. This includes the headquarters of owners and tenants.

RATIONALE/SIGNIFICANCE OF FACTOR: Displacement of farm businesses through land and building loss will result in a direct economic impact to the concerned farm operators as well as the agricultural sector of the local economy. The highest impact would be associated with owned farms because of financial and personal ties to the operation.

INTERPRETATION: Farm property data was compiled on 1:10,000 scale maps and assigned relative constraint levels. Land owned and farmed with headquarters on the property was considered a major constraint. Land rented and farmed with headquarters on the property and, land owned and farmed with headquarters elsewhere was considered a moderate constraint. Little or no constraint included rented farmland with no buildings, and land not farmed.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Cropland.

STUDY AREA: Site Acquisition Area

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT** X
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**

DEFINITION OF FACTOR: The reported area of crops in the site interviews with farmers. This includes all winter wheat, oats, barley, mixed grains, rye, buckwheat, small grains, corn, soybeans, hay and specialty crops.

RATIONALE/SIGNIFICANCE OF FACTOR: Cropland indicates the intensity of existing agricultural land use. The effects on agricultural production of displacing cropland is greater than the displacement of land which is in a non-agricultural use, or is idle.

INTERPRETATION: Specific field crop information collected during site interviews with farmers were marked on 1:10,000 scale base maps. Specialty crops were considered a major constraint, other crops a moderate constraint and land not cropped little or no constraint.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Active farm complexes.

STUDY AREA: Access Roads

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS X	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**

DEFINITION OF FACTOR: The number of active farm complexes along access roads. These are the complex of barns, sheds, silos, etc. which make up the basic physical infrastructure of a farm operation.

RATIONALE/SIGNIFICANCE OF FACTOR: This factor was used in the preliminary Phase 4A analysis to indicate the degree of potential conflict between O.W.M.C.-related truck movements and the movements of farm machinery.

INTERPRETATION: Active farm complexes were identified by field inspection in Phase 3B, updated for new roads, located on 1:50,000 scale maps, and totaled for local and regional access roads.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Farm complexes with livestock.

STUDY AREA: Access Roads

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
X		

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: The number of farm complexes which show evidence of being used for livestock/poultry.

RATIONALE/SIGNIFICANCE OF FACTOR: This factor was used in the preliminary Phase 4A analysis to indicate the livestock/poultry along access roads that are at risk due to accidential spills of untreated toxic materials.

INTERPRETATION: Farm complexes with livestock and/or poultry were identified by field inspection (i.e. livestock observed, manure piles, farm signs, etc.), located on 1:50,000 scale maps and totaled for regional and local roads.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Soil Capability.

STUDY AREA: Access Roads

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
X		

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: Total hectares of land along access roads measured as Class 1 equivalents.

RATIONALE/SIGNIFICANCE OF FACTOR: In the preliminary Phase 4A analysis of access roads, this factor indicated the degree to which land resources may be lost if local roads are widened.

INTERPRETATION: The length of each CLI soil capability class along the access roads were measured on 1:50,000 scale soil capability maps. The classes were converted to Class 1 equivalents according to the `Hoffman indices´ - refer to the factor sheet page A-40 for details.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Sensitive crops.

STUDY AREA: Access Roads

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY DEFINITION**
X		
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**

DEFINITION OF FACTOR: Crops which are potentially sensitive to spills of untreated hazardous waste in transit.

RATIONALE/SIGNIFICANCE OF FACTOR: In the preliminary Phase 4A analysis, this factor measured the relative risk to sensitive crops along access roads. If untreated hazardous wastes are spilled in transit, there is a potential for crops to be affected and thus cause economic loss through yield reductions, and/or consumer reluctance to purchase exposed crops.

INTERPRETATION: Sensitive crops were estimated within a 2 km band centred on the access roads. The area of crops were obtained from the 1981 Census of Agriculture, Statistics Canada and a per hectare crop value was calculated, based on a five year average value per hectare (available from the Agricultural Statistics for Ontario Publication 20, O.M.A.F. [1978-1982]).

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Proximity to farm buildings.

STUDY AREA: Rail Access Options - Constraint Mapping

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
	X	
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**

DEFINITION OF FACTOR: Farm building complexes that could be impacted by the rail option.

RATIONALE/SIGNIFICANCE OF FACTOR: Farm buildings are used to indicate viable farm operations. Noise and risk of accident could interfere with farm activities, the relative impact depending on the condition of the farm buildings.

INTERPRETATION: In the constraint mapping stage of analysis, the location and condition of farm buildings were transferred from the 1:10,000 Agricultural Land Use Maps prepared in Phase 3B (see Site Selection Process Phase 3B: Selection of Candidate Site - Agriculture, October 31, 1984). The siting of rail lines is considered to have a potentially high impact on commercial farm buildings which are in average and above average condition, a moderate imapct to hobby or horse farms and a low impact to unused or derelict farm buildings.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Severance of farm parcels.

STUDY AREA: Rail Access Options - Constraint Mapping

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
	X	

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: Farm parcels which could be severed by a rail spur line.

RATIONALE/SIGNIFICANCE OF FACTOR: A rail spur line may sever farm properties, creating small inefficiently-sized fields or restrict farm machinery access to fields if crossings are not provided. Alignments that run along property lines would pose the least constraint from the point of view of agriculture.

INTERPRETATION: In the constraint mapping analysis the boundaries of land parcels were obtained from the Ministry of Revenue Assessment Roll maps and marked on the 1:10,000 working maps. Severance of farm properties >50 ha in size was considered a high impact, 12-50 ha a moderate impact and <12 ha a low impact.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Cropland.

STUDY AREA: Rail Access Options - Constraint Mapping

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
	X	

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: The reported area of crops identified in the interviews with farmers. Cropland includes all winter wheat, oats, barley, mixed grains, rye, buckwheat, small grains, corn, soybeans, hay and specialty crops (field vegetables, market gardens, nurseries, orchards, vineyards, berries and sod farms).

RATIONALE/SIGNIFICANCE OF FACTOR: The presence of land currently being used for crop production is an indicator of the potential for agricultural impact.

INTERPRETATION: In the constraint mapping analysis, the areas of general crops and specialty crops were obtained from the crops and livestock population maps which were compiled for the comparison of siting options, and marked on the 1:10,000 working maps. Impacts to specialty crops and sod were considered high, and impacts to other cropped land were considered moderate. Impacts to land not cropped were considered low.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Loss of farmland.

STUDY AREA: Rail Access Options - Comparative Evaluation

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
	X	

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: Loss of farmland is measured as the amount of Class 1 equivalents of land that would be removed by a rail right-of-way.

RATIONALE/SIGNIFICANCE OF FACTOR: Preservation of highly productive agricultural soils is a goal of the Foodland Guidelines of the Ontario Ministry of Agriculture and Food. The loss of farmland is, therefore, an important issue in Ontario.

INTERPRETATION: The total productive land removed by rail alignments will be described in terms of Class 1 equivalent productivity-rating units (see Hoffman indices, page A-40 for details).

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to existing farm operations.

STUDY AREA: Rail Access Options - Comparative Evaluation

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
	X	

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER

DEFINITION OF FACTOR: Measures the potential disruption to farming activities by the rail spur line.

RATIONALE/SIGNIFICANCE OF FACTOR: Placement of rail access lines may have disruptive impacts by severing farm properties and disrupting livestock. Crops adjacent to the rail option could also be contaminated or destroyed by rail accidents or spills of materials while in transit.

INTERPRETATION: Impacts to farm buildings, cropland and the severance of property were all considered in the comparative evaluation of rail options. These indicators were subsequently aggregated, weighed and ranked according to the potential impact.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to existing farm operations.
INDICATORS (1): Severance of farm parcels.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Rail Access Options - Comparative Evaluation

DEFINITION: Farm parcels which could be severed by a rail spur line.

RATIONALE/SIGNIFICANCE: Small fields could be created which would be inefficient to farms with existing machinery. If crossings are not provided, machinery access to fields may be restricted. Routes with the fewest number of severances are preferred.

SOURCES OF INFORMATION: Ministry of Revenue assessment roll maps.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Each rail option was assigned a low, medium or high rating representing the degree of impact on farms. These categories were based on the number of severances and a subjective assessment of the potential severity of the severance.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to existing farm operations.

INDICATORS (2):
Proximity to farm buildings.

CONSULTANT: Ecologistics Limited

STUDY AREA: Rail Access Options - Comparative Evaluation

DEFINITION: Farm buildings within 250 m either side of the rail option.

RATIONALE/SIGNIFICANCE: The number of barns within the impact zone indicates the direct impact of the rail access options to farming.

SOURCES OF INFORMATION: Agricultural land use maps (1:10,000) contained in Phase 3B Agricultural Report identify the location of farm buildings.

INPUTS FROM OTHER CONSULTANTS: The 250 m impact zone was defined by the transportation consultant (M.M. Dillon, 1985b).

COMMENTS/ASSUMPTIONS/LIMITATIONS: The number of farm buildings within 250 m on either side of the tracks will indicate the direct impacts of the rail alignment to farming. This includes impacts to livestock from noise and potential spills. Since it was not possible to confirm by roadside surveys the nature of livestock and poultry housed, all actively used barns were assumed to be routinely used for livestock and/or poultry.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to existing farm operations.

INDICATORS (3):
Amount of Cropland in the Corridor.

CONSULTANT: Ecologistics Limited

STUDY AREA: Rail Access Options - Comparative Evaluation

DEFINITION: The area of cropland within 250 m either side of the rail option. Cropland includes the following crop categories: small grains, row crops, fruits, vegetables and berries, nurseries and sod.

RATIONALE/SIGNIFICANCE: Provides a measure of the relative risk to standing crops due to rail accidents or spills of transported materials. Destruction or contamination of crops could result from a rail accident or spill. Potential impacts are greater for routes with a large amount of cropland than for routes with more idle and non-agricultural land.

SOURCES OF INFORMATION: Crop and livestock maps prepared for the comparative evaluation of siting options (1:10,000).

INPUTS FROM OTHER CONSULTANTS: The 250 m impact zone was defined by the transportation consultant (M.M. Dillon).

COMMENTS/ASSUMPTIONS/LIMITATIONS: A 500 m band centred on the track was overlaid on the 1:10,000 crop and livestock maps. Cropland includes the following categories: small grains, row crops, fruits, vegetables and berries, nurseries and sod.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption of existing farm operations.

STUDY AREA: Vicinity.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT X	**SITING OPTION COMPARISON**	**OTHER**

DEFINITION OF FACTOR: This factor measures the characteristics of farms with headquarters situated between the site acquisition area and approximately 2 km from the site centre.

RATIONALE/SIGNIFICANCE OF FACTOR: Farm businesses within 2 km of a site may be directly or indirectly affected by the operations of the treatment facilities.

INTERPRETATION: The number of farms with headquarters in this area (both owned and rented) will provide a relative measure of the operators who could be affected by the various siting combinations of the treatment facilities.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to existing farm operations.
INDICATORS (1): Number of farms with headquarters in the vicinity.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: Number of farm operations where the operator has his/her headquarters in the vicinity; both owners and resident tenants are included.

RATIONALE/SIGNIFICANCE: The degree of potential impact is considered to increase as the number of farm operations with vicinity headquarters increase (in a linear relationship).

SOURCES OF INFORMATION: Interviews with farm operators (Appendix B).

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The number of farms with headquarters (both owned and rented) were summed for each siting option involved in the comparison.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption of agricultural community.

STUDY AREA: Vicinity.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER
X		

DEFINITION OF FACTOR: This factor indicates the relative impact that the introduction of industrial uses such as the physical/chemical treatment plant to an area will have on the land base of the local agricultural community.

RATIONALE/SIGNIFICANCE OF FACTOR: The potential effects on agriculture of introducing industrial uses such as the physical/chemical treatment plant into an area when agriculture is the dominant activity will be greater than in areas where there are numerous non-agricultural activities.

INTERPRETATION: The factor describes the extent to which non-farm development has extended into an area. Indicators measure tenure, use of land and percent of farmland in parcels >12 ha. These indicators were compiled into an index of `agricultural stability,´ with owned farmland in large proportions indicating the greatest stability.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Agricultural community impacts.
INDICATORS (1): Percent of land in non-farm uses.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: The proportion of land in the vicinity that is not used for farming.

RATIONALE/SIGNIFICANCE: Measures the current degree of intrusion by non-agricultural uses.

SOURCES OF INFORMATION: Interviews with farm operators (Appendix B).

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: This indicator describes the land as farm or non-farm at a point in time, and does not measure the rate of change or the kind of development taking place.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Agricultural community impacts.
INDICATORS (2): Percent of farmland that is owned.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: The proportion of farmland that is owned by the operator within the vicinity.

RATIONALE/SIGNIFICANCE: Farmers have a greater degree of control in determining the long-term use of owned land than rented land.

SOURCES OF INFORMATION: Interviews with farm operators (Appendix B).

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: This indicator describes land ownership patterns at a point in time and does not measure the rate of change or development taking place.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Agricultural community impacts.

INDICATORS (3):
Percent of farmland in parcels >12 ha.

CONSULTANT: Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: The proportion of farmland in the vicinty that is in parcels greater than 12 ha in size.

RATIONALE/SIGNIFICANCE: Indicates the availability of land parcels that are large enough to be utilized efficiently by commercial farm operations. Non-farm development fragments farmland into small parcels that make commercial agriculture less efficient.

SOURCES OF INFORMATION: Interviews with farm operators (Appendix B) and assessment roll data.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: This indicator describes the proportion of land in parcels greater than 12 ha at a point in time and does not measure the rate of change or development taking place.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption of existing farm operations.

STUDY AREA: Access Roads.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
X		

DEFINITION OF FACTOR: This factor measures the characteristics of existing farm operations along access roads which would be affected by the transportation of materials to the siting options.

RATIONALE/SIGNIFICANCE OF FACTOR: Transportation of materials may have an effect on farming activities along the access roads. Effects include interference with daily farming activities and farm traffic on access routes.

INTERPRETATION: The number of farms with headquarters on properties which abut the access roads and the agricultural vehicle impact index are two indicators which provide evidence of potential for O.W.M.C. related traffic conflict with farming activities. Transportation risk was accounted for in the compilation of the agricultural vehicle impact index.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption of existing farm operations.
INDICATORS (1): Number of farms with headquarters.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Access roads.

DEFINITION: Number of farm operations abutting access roads where the operator has his/her headquarters; both resident owners and resident tenants are included.

RATIONALE/SIGNIFICANCE: The degree of potential impact is considered to increase as the number of farm operations with headquarters abutting access roads increases (in a linear relationship).

SOURCES OF INFORMATION: Access road questionnaires.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The number of farms with headquarters is a measure of the number of farm operations and farm families that could be affected on a daily basis by the operation of a physical/chemical treatment plant.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption of existing farm operations.
INDICATORS (2): Agricultural vehicle impact index.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Access roads.

DEFINITION: Indicates the potential for conflict between O.W.M.C.-related traffic and farm machinery on access roads.

RATIONALE/SIGNIFICANCE: Trucks hauling materials to and between facilities may interfere with farm traffic. This indicator will indicate the probability of accidents with farm vehicles and machinery, thereby increasing the risk to the vehicle operator.

SOURCES OF INFORMATION: Access road questionnaires.

INPUTS FROM OTHER CONSULTANTS: Agricultural vehicle impact index from the transportation consultants (M.M. Dillon).

COMMENTS/ASSUMPTIONS/LIMITATIONS: Access road questionnaire coverage was not complete. Consequently, collected data was extrapolated for missing properties in order to ensure complete coverage of routes. Details of the agricultural vehicle impact index calculations are contained in Appendix C.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Displacement of farms with on-site headquarters.

STUDY AREA: Site

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: The removal of a farm building complex that serves as the headquarters for a farm unit and/or enough of the farm's land base to cause the operation to become economically non-viable. Farms considered here are those completely displaced as a result of the site selection. Farms with headquarters located off-site which would lose land on-site are addressed under the Partial Displacement of Farms factor on page A-43.

RATIONALE/SIGNIFICANCE OF FACTOR: Individual farm businesses are the basic unit sustaining the province's agricultural sector. Displacement of farm businesses through land and building loss will result in a direct economic impact on the concerned farm operators and the agricultural sector of the local economy. It will result in a reduction of food production from the local agricultural community. The severity of impact will depend upon the size, level of capital investment and level of production of the affected farm businesses.

INTERPRETATION: The assessment of indicators is undertaken for owner-operated and leased farms with headquarters located on-site. All or part of the farm's land base may be taken. The loss of land and/or buildings must be sufficient to cause complete displacement of the operation.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Displacement of farms with on-site headquarters.
INDICATORS (1): Number of farm operations with on-site headquarters.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Site.

DEFINITION: The number of farm businesses with on-site headquarters. A distinction is made between on-site farm business using owned versus rented land.

RATIONALE/SIGNIFICANCE: This indicator measures the relative number of farm businesses that could be displaced. The tendancy should be to choose a site with the fewest number of existing farm businesses and to avoid one where most of the lands are owned by the operators.

SOURCES OF INFORMATION: Personal interviews with farm operators.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Displacement of farms with on-site headquarters.

INDICATORS (2):
Average size of farm businesses.

CONSULTANT: Ecologistics Limited

STUDY AREA: Site.

DEFINITION: The average size, in hectares of land, utilized by farm operators who have on-site headquarters. A distinction is made between owned and rented land.

RATIONALE/SIGNIFICANCE: Farm size is an important determinant of the production potential of a farm. Generally, the significance of farm business displacement will be greater for farms with a large land base. Impact to the operators will generally be greater for those who own most of their land base than for those who rent most of it.

SOURCES OF INFORMATION: Personal interviews with farm operators.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: For this indicator, total land holdings are given, not just on-site land holdings. This may encompass land holdings elsewhere within the local farm community. Off-site land will not be necessarily taken out of production whereas on-site land will. The off-site lands could normally be integrated into some other operation(s) so that their production potential is not necessarily lost.

Agricultural production will be a function not only of land holdings but also of other fixed assets such as buildings, equipment and stock. Land holdings are used as a measure here since they are most closely related to the production of crops, a primary farming activity. Other types of assets such as buildings can more readily be moved or replaced. Moreover, they cannot be measured directly using simple units such as hectares.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Displacement of farms with on-site headquarters.
INDICATORS (3): Estimated gross farm revenue.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Site.

DEFINITION: Estimated gross farm revenue generated by the on-site farmlands in 1984. This includes the estimated gross revenue generated by actively used on-site farmlands that are operated by farms with on-site or off-site headquarters.

RATIONALE/SIGNIFICANCE: Gross revenue is a summary measure of the potential agricultural output of all actively used farmlands within the site acquisition area that would be lost to the community due to the facilities.

SOURCES OF INFORMATION: From crop and livestock data obtained in interviews with farm operators. Revenues were estimated using on-site crops and livestock data and published data on crop and livestock values.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: While net revenue would have been a more telling indicator of lost economic output potential, gross revenues could be calculated with more confidence.

It was necessary to estimate the gross revenues because few operators gave revenue information during the interviews. The need to estimate revenues limits the use of the data for predicting impacts in an absolute sense. However, the data are considered reliable for site comparisons.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Loss of farmland.

STUDY AREA: Site.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: Loss of farmland refers to the number of Class 1 equivalents of land and the amount of tile drained land that would be encompassed by the site acquisition area.

RATIONALE/SIGNIFICANCE OF FACTOR: Productive agricultural land in Ontario is concentrated in the southern half of the province where urban development pressures are greatest. The loss of farmland is, therefore, an important issue in Ontario; one that must be addressed in all major development projects. Preservation of highly productive agricultural soils is a goal of the Foodland Guidelines of the Ontario Ministry of Agriculture and Food.

The derived soil productivity ratings and data on existing tile drainage provide the level of detail required for comparing the production potential of candidate sites. Sites with the lowest productivity ratings and the least tile drainage are preferred for siting OWMC facilities.

INTERPRETATION: The total productive land in each site acquisition area will be described in terms of Class 1 equivalent productivity-rating units (Hoffman indices) in order to facilitate comparisons of different sized sites with different combinations of soil capability classes.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Loss of farmland.

INDICATORS (1):
Soil capability.

CONSULTANT: Ecologistics Limited

STUDY AREA: Site.

DEFINITION: Total hectares of land measured as Class 1 equivalent land within the site acquisition area.

RATIONALE/SIGNIFICANCE: This indicator identifies soils best suited to continuous cultivation of common field crops. It uses an index signifying the relative production potential compared with Class 1 potential. For example, 100 hectares of Class 2 land can produce the same output as 80 hectares of Class 1 land using the same inputs. It measures the potential agricultural value of lands as opposed to the value realized by existing farm operations. This potential would be eliminated on-site and could be reduced in the vicinity.

SOURCES OF INFORMATION:

1. On-site - detailed field survey to systematically map soils following the classification and mapping procedures of the Ontario Institute of Pedology; capability ratings applied to soil map units using criteria of the Canada Land Inventory (O.I.P., 1984).

2. Site vicinity - county soil maps and capabiltiy ratings of Canada Land Inventory.

INPUTS FROM OTHER CONSULTANTS: None.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Loss of farmland.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Land is evaluated under the Canada Land Inventory system to indicate relative production potential for common field crops. Class 1 soils are ideally suited to cropping while other classes exhibit various constraints related to topography, drainage, fertility, etc. In Ontario, lower capability soils are related to Class 1 soils using empirically-determined indices of the relative yield potential of field crops. These "Hoffman" indices are as follows:

Class 1 - 1.00
Class 2 - 0.80
Class 3 - 0.64
Class 4 - 0.49
Class 5 - 0.32

Total hectares of Class 1 equivalent soils are determined by multiplying the hectares in each Class by its corresponding index value. The resulting measure is directly related to the potential yield of field crops. Further details are available in Environment Canada, The Assessment of Soil Productivity for Agriculture, ARDA Report. No. 4 (CLI Program), November 1971, 57 p.

The soil capability system assigns capability ratings on the basis of continuing soil constraints such as poor fertility or drainage after normal soil management pratices such as tile drainage have been implemented.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Loss of farmland.

INDICATORS (2):
Tile drainage.

CONSULTANT: Ecologistics Limited

STUDY AREA: Site.

DEFINITION: Area of tile drained land on-site.

RATIONALE/SIGNIFICANCE: Excess moisture is usually the major limitation on clay soils such as those on potential OWMC sites. Tile drainage can be used to help overcome this limitation to cropping. The tendancy should be to avoid sites on which investments have already been made in tile drainage.

SOURCES OF INFORMATION: Questionnaire data supplemented with field observations made during the soil survey.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The Canada Land Inventory land classification does not account for actual soil management, assuming instead an optimum management level. This limitation is in part overcome by this indicator which accounts for drainage improvements.

The impact of tile drainage will depend on design and maintenance of the drainage system. However, the characteristics and quality of tile drainage systems are not accounted for here.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Partial displacement of farms.

STUDY AREA: Vicinity.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: Disruption to off-site farm operations that lose on-site land holdings.

RATIONALE/SIGNIFICANCE OF FACTOR: Loss of land by off-site farms due to on-site land acquisition represents a direct loss of productive assets affecting farm output. The loss is greater when the on-site lands are owned and the parcels are large.

INTERPRETATION: Though farm operators are compensated for expropriated lands, they may nevertheless experience disruption due to a reduction in their land base. For example, livestock operators may have to reduce herd size or secure alternate sources of feed grain. If suitable lands can be purchased or rented to replace lost land, then disruption to farm operators are short-term in nature.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Partial displacement of farms.

INDICATORS (1):
Number of farm operations affected.

CONSULTANT: Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: The number of farm operations where the operator with off-site headquarters will lose on-site land.

RATIONALE/SIGNIFICANCE: The degree of potential impact is considered to increase as the number of farms losing on-site land increases.

SOURCES OF INFORMATION: Interviews with farm operators and assessment roll data.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Measures the number of off-site farms that would have a direct loss of land base due to the acquisition of on-site lands.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources

FACTOR: Partial displacement of farms.

INDICATORS (2): Average size of lost parcels.

CONSULTANT: Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: The average size of on-site parcels farmed by operators with headquarters located off-site.

RATIONALE/SIGNIFICANCE: Measures the relative amount of land that would be lost by off-site farms.

SOURCES OF INFORMATION: Interviews with farm operators and assessment roll data.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Indicates the amount of land lost by off-site farms.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Partial displacement of farms.

INDICATORS (3):
Proportion of land base lost.

CONSULTANT: Ecologistics Limited

STUDY AREA: Vicinity.

DEFINITION: The proportion of total land holdings that would be lost by farm operations with headquarters located off-site. A distinction is made between on-site lands that are owned and those that are rented.

RATIONALE/SIGNIFICANCE: The degree of impact is a function of the proportion of the land base that is lost. Also, the loss is greater when owned lands are lost.

SOURCES OF INFORMATION: Interviews with farm operators and assessment roll data.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The degree of impacts to farms losing a high proportion of the land base would be high, especially if replacement lands are not available.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption of adjacent farm operations.

STUDY AREA: Adjacent Vicinity.

FACILITY COMPONENTS AFFECTED: All site facilities.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: Farm businesses situated adjacent to the site are susceptible to some, or all, of the following: reduced land value, reduced efficiency and flexibility of operation, and effects on the production or marketability of crops and livestock. Operations that may be affected include farms that are adjacent or in close proximity to the site facilities. Only operations that are disrupted by on-site activities are considered here and not those that are entirely displaced nor those that experience disruptions along access routes. Disrupted operations may include operations that lose on-site lands but that otherwise are expected to remain intact. These are treated under a separate factor. A distinction is made between those farms which are immediately adjacent to the site and those in a non-adjacent vicinity which extends from the adjacent farms for a distance of about 2 km, from the site centre.

RATIONALE/SIGNIFICANCE OF FACTOR: Disruption of farm businesses could result in a direct and continuing economic loss to farm operators, and to the local and regional economies. This loss constitutes a cost to the project that should be accounted for and weighed against other costs and benefits even if it can be measured only in a relative sense. The presence of the facilities will cause a shadow of doubt about the "safety" of farming in the zone of influence. This is a matter of perception and is impossible to quantify and to predict. The phenomenon may be more significant where crops are grown that are directly edible by humans e.g. fruit and vegetables are grown near the site(s).

INTERPRETATION: The economic impact on farm operations near each site is estimated in a relative sense based on the relative occurrence of potentially affected agricultural resources and activities in each study area. Estimates of direct economic loss are not made.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to adjacent farm operations.

INDICATORS (1):
Number of farm operations with headquarters.

CONSULTANT: Ecologistics Limited

STUDY AREA: Adjacent vicinity.

DEFINITION: Number of farm operations where the operator has his/her headquarters on the adjacent property; both owners and resident tenants are included.

RATIONALE/SIGNIFICANCE: The degree of potential impact is considered to increase as the number of farm operations with adjacent headquarters increases (in a linear relationship).

SOURCES OF INFORMATION: Interviews with farm operators, assessment roll data and field inspections.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The number of farms with headquarters is a measure of the number of farm operations and farm families that could be affected on a daily basis by the operations of the O.W.M.C. facilities.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to adjacent farm operations.
INDICATORS (2): Number of operations with owned land.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Adjacent vicinity.

DEFINITION: The number of operations that farm owned land adjacent to the site.

RATIONALE/SIGNIFICANCE: Potential effects such as property devaluation would be of greatest concern to those operators owning land next to the site. The impact potential is greatest for the site with the most owned farmland adjacent.

SOURCES OF INFORMATION: Interviews with farm operators.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: It is assumed that any impacts on property values would be confined mainly to adjacent land parcels.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to adjacent farm operations.
INDICATORS (3): Livestock density.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Adjacent vicinity.

DEFINITION: Livestock populations measured as total animal units divided by total area of the adjacent vicinity. This is an expression of livestock density and, therefore, accommodates differences in study area size among siting options.

RATIONALE/SIGNIFICANCE: The potential for impact is greatest where level of agricultural infrastructure i.e. fixed assets, is greatest. Generally, the level of fixed assets is largest in the case of livestock enterprises and the investment in infrastructure is roughly proportionate to the livestock population.

SOURCES OF INFORMATION: Interviews with farm operators and farm groups, local agricultural specialists, and marketing board officials.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Detailed appraisals of farm structures would yield the most accurate estimate of infrastructure investment; however, this level of detail was not possible during the farm survey which covered many farm operations across eight sites.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to adjacent farm operations.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Livestock are measured using an animal unit convention for comparing different livestock types. Animal unit equivalents are as follows:

dairy cow - 1.0
beef cow - 1.0
heifer - 1.0
steer - 1.0
pig - 0.222
chicken or turkey - 0.011
duck - 0.050
geese - 0.050
goat - 0.050
sheep - 0.050
horse - 1.0

These units are based on total digestible nutrient requirements for livestock/poultry determined by the National Research Council (1975-1984).

By using such summary measures, it is possible to limit the amount of data to be considered; however, the measures do not account for variations in types of livestock.

Livestock data for the vicinity study area represent agricultural activity in a single year, 1984. Thus the data do not reflect changes arising from year to year variations or trends in use, nor do they necessarily represent a long-term average.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption of non-adjacent farm operations

STUDY AREA: Non-adjacent vicinity.

FACILITY COMPONENTS AFFECTED: All site facilities.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: This factor measures the characteristics of farms with headquarters situated between adjacent operations and approximately 2 km from the site centre. These will be less vunerable to impacts but will generally be in the zone of direct influence of the O.W.M.C. facilities.

RATIONALE/SIGNIFICANCE OF FACTOR: Farms in the non-adjacent vicinity will be less vulnerable than the adjacent farms to impacts but will be in the zone of direct influence of the O.W.M.C. facilities. Although the actual impacts cannot be predicted, the more intensive the levels of agricultural activity in the zone, the higher the potential for impact.

INTERPRETATION: The impact on farms near the sites are estimated based on the relative intensity of agricultural resources and activities in the study area.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption of non-adjacent farm operations
INDICATORS (1): Number of farm operations with headquarters.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Non-adjacent vicinity.

DEFINITION: Number of farm operations where the operators have their headquarters in the non-adjacent vicinity. Both resident owners and resident tenants are included.

RATIONALE/SIGNIFICANCE: The degree of potential impact is considered to increase as the number of farm operations with adjacent headquarters increases (in a linear relationship).

SOURCES OF INFORMATION: Interviews with farm operators, assessment roll data and field inspections.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The operations will be less vulnerable to the potential impacts to adjacent farms but will generally lie within the zone of direct influence of the facilities.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption of non-adjacent farm operations.

INDICATORS (2):
Proportion of land in crops.

CONSULTANT: Ecologistics Limited

STUDY AREA: Non-adjacent vicinity.

DEFINITION: Cropping uses are measured as the total reported area in crops on farm land divided by the total area of the non-adjacent vicinity.

RATIONALE/SIGNIFICANCE: To the extent that they may occur, economic impacts are directly related to the level of production activities. The potential for such impacts are thus assessed in a relative sense by measuring the intensity of cropping activity in the non-adjacent vicinity study area. This factor distinguishes between areas that are dominated by agricultural and those which have more non-agricultural land uses use such as non-farm woodlots, recreational areas, residential, commercial and industrial uses and also former agricultural lands which are now idle.

SOURCES OF INFORMATION: Farm survey questionnaire and roadside or "windshield" surveys of crops (where questionnaire data was not available).

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Crops are measured as the hectares of cropped land reported in the site and vicinity questionnaires. Information represents activities for 1984. Thus the data do not reflect changes arising from year to year variations or trends in use, nor do they necessarily represent a long-term average.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to non-adjacent farm operations.
INDICATORS (3): Livestock density.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Non-adjacent vicinity.

DEFINITION: Livestock populations measured as total animal units divided by the total area of the non-adjacent vicinity.

RATIONALE/SIGNIFICANCE: The potential for impact is greatest where level of agricultural infrastructure, i.e. fixed assets, is greatest. Generally, the level of fixed assets is largest in the case of livestock enterprises and the investment in infrastructure is roughly proportionate to the livestock population.

SOURCES OF INFORMATION: Interviews with farm operators and farm groups, local agricultural specialists, and marketing board officials.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Detailed appraisals of farm structures would yield the most accurate estimate of infrastructure investment; however, this level of detail was not possible during the farm survey which covered many farm operations across eight sites.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Stability of farm population.

STUDY AREA: Local Agricultural Community.

FACILITY COMPONENTS AFFECTED: All

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: This factor addresses the effects of the introduction of a non-agricultural land use on the local agricultural community that could result from effects on the viability of farm operations in the vicinity. Short-term effects could stem from impacts on employment and agribusiness sales as well as the reduction in number of farm families. In the long-term, the stability of the farm community, could be detrimentally impacted by the siting of a waste management facility. The significance of this impact will be influenced by the current degree of community stability.

RATIONALE/SIGNIFICANCE OF FACTOR: The displacement and disruption of farms will have impacts extending beyond the production-related effects on impacted farms. Certain of these off-farm impacts will relate directly to the economic viability and future stability of the agricultural community in the vicinity of each site.

INTERPRETATION: The focus of analysis here is on those attributes of the farm community that describe the degree of stability and viability of farming as a way of life rather than on the overall agricultural community which is of concern in the analysis of social impacts. Accordingly a narrow range of indicators is considered sufficient.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Stability of farm population.

INDICATORS (1):
Age of operators.

CONSULTANT: Ecologistics Limited

STUDY AREA: Local agricultural community.

DEFINITION: Proportion of farm operators below 55 years of age.

RATIONALE/SIGNIFICANCE: Retirement is typically a time when farm assets are sold and when farm property may be acquired by non-farming interests. Though farm operators are generally free to choose their own age of retirement, 55 is generally considered (in the literature) to be a typical age when operators start becoming less involved in day-to-day operations of a farm and start the transition to retirement. The tendency should be to avoid agricultural communities which have a high proportion of the farm operators in the less than 55 age class.

SOURCES OF INFORMATION: Interviews with farm operators.

INPUTS FROM OTHER CONSULTANTS: Data provided by the Institute of Environmental Research.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The age profile of farm operators must be interpreted cautiously since retirement does not necessarily mean that farm properties will pass out of the agricultural sector. Even if they are purchased by non-farm interests, they may remain in production under the management of tenants. However, a high proportion of farmers 55 years or over suggest that fewer new/younger farmers are active in the community. The community may be seen as having limited future potential for long-term agriculture.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Stability of farm population.

INDICATORS (2):
Full-time operators (percent of total operators).

CONSULTANT: Ecologistics Limited

STUDY AREA: Local agricultural community.

DEFINITION: The proportion of operators with no off-farm work.

RATIONALE/SIGNIFICANCE: Indicates the extent to which operators obtain their income from the farm. A low percentage of full-time operators suggests a low degree of non-commercial scale agriculture in the commmunity. Areas which have a low percentage of full-time operators are preferred over those with a high percentage.

SOURCES OF INFORMATION: Interviews with farm operators; farm operators indicated their most appropriate (full or part-time) classification.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Areas with a high proportion of part-time farmers will generally be less effective in realizing the full, long-term potential of an area for agriculture.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Stability of the agricultural land base.

STUDY AREA: Local agricultural community.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: This factor will address the effects that the introduction of the O.W.M.C. facilities will have on the land base of the local agricultural community. Indicators will measure the extent to which land under the pressures of urbanization has been diverted from commercial agriculture. The preference should be to locate the O.W.M.C. facilities in urbanizing areas.

RATIONALE/SIGNIFICANCE OF FACTOR: The intrusion of non-agricultural activities such as the O.W.M.C. facility into agricultural areas will have less impact on those experiencing urbanization pressures than those where agriculture is the dominant activity.

INTERPRETATION: The factor will describe the extent to which non-farm development has extended into an area. Indicators will measure the tenure and use of land proportion of non-farm residences, and private ownership. An additional consideration is the level of commitment of land use plans to protect the area for long-term agricultural uses.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Stability of the agricultural land base.

INDICATORS (1):
Land tenure.

CONSULTANT: Ecologistics Limited

STUDY AREA: Local agricultural community.

DEFINITION: The ownership statis and use of rural land parcels that are considered large enough (>12.6 ha) to be viable as part of commercial-scale agriculture.

RATIONALE/SIGNIFICANCE: This indicator measures the extent to which the tenure and use of rural land parcels has already shifted from control by long-term agricultural interests. This is described by three sub-indicators:
a) the proportion of land in parcels >12.6 ha;
b) the proportion of farmland that is owned by the operator(s);
c) the proportion of the study area that is actively farmed.

A low proportion of land in large parcels and low proportion of land farmed by owners can lead to less productive and inefficient use of the land for farming. A low proportion of land farmed indicates the relative amount of community land under farming activities.

The tendancy should be to locate the facilities in an area where these sub-indicators reflect a higher degree of non-agricultural tenure and use.

SOURCES OF INFORMATION: Interviews with farm operators, Ministry of Revenue Assessment Roll Data.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: These indicators describe land ownership and use at a point in time and do not measure the rate of change or development taking place.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Stability of the agricultural land base.
INDICATORS (2): Farm residences (percent of total residences).	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Local agricultural community.

DEFINITION: The proportion of rural residences that are the homes of farmers.

RATIONALE/SIGNIFICANCE: The proportion of farm residences indicates the extent to which non-farm residential development is present in the agricultural community. Low proportions of farm residences can indicate a significant degree of non-agricultural interests in the farming community and a higher potential for conflict between agricultural operations and those interests thus reducing efficiency and/or increasing the cost of farming operations.

SOURCES OF INFORMATION: Institute of Environmental Research.

INPUTS FROM OTHER CONSULTANTS: Institute of Environmental Research.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The proportion of residences will not reflect situations where non-farm houses are `clustered´ (e.g. rural subdivisions).

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Stability of the agricultural land base.
INDICATORS (3): Agriculturally designated lands.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Local agricultural community.

DEFINITION: "Agricultural" and "rural" designations in local and regional official plans were used to identify areas designated agricultural. The amount of Class 1 equivalent land within agriculturally designated areas, taken as a percentage of the study area, was used to compare sites.

RATIONALE/SIGNIFICANCE: Within an agricultural community, land use controls provide a primary control of non-agricultural land uses. The force of this control will depend on policies stipulated in a community's official plans. This indicator will reflect the controls placed on protection of agricultural lands and the relative quality of the land that has been designated. The preference is to select an area with the least amount of agriculturally designated class 1 equivalents.

SOURCES OF INFORMATION: Regional and local official plans.

INPUTS FROM OTHER CONSULTANTS: Land use designations supplied by Leon Kentridge Associates Limited.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Planning documents are subject to change.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Stability of the agricultural farm base.
INDICATORS (4): Private land ownership.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Local agricultural community.

DEFINITION: The percentage of land in the community study area that is in private ownership.

RATIONALE/SIGNIFICANCE: Public agencies normally acquire farmland only when non-farm uses are being contemplated for the properties. A low proportion of privately owned land means that there is uncertainty about the future of agriculture on the publicly owned lands. Although the land may be presently used for agriculture, the future long-term use is uncertain as decisions about the long-term use of the land are not in the control of farmers.

SOURCES OF INFORMATION: Ministry of Revenue Assessment Rolls, 1983.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Lands owned by public institutions for roads, utility corridors, and conservation areas are not considered. Plans of public agencies are subject to change and lands can revert to agriculture.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources

FACTOR: Disruption to the farm economy

STUDY AREA: Regional community.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	**RAIL ACCESS**	**BOUNDARY REFINEMENT**
LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	**SITING OPTION COMPARISON**	**OTHER**
	X	

DEFINITION OF FACTOR: This factor indicates the relative potential disruption to the farm economy beyond the local agricultural community by the O.W.M.C. waste treatment facility operations.

RATIONALE/SIGNIFICANCE OF FACTOR: The operation of an O.W.M.C. waste treatment and disposal facility is not considered to be a compatible use with an agricultural area. Although the magnitude of the probable effects cannot be quantified, the effects are expected to be proportionate to the level of activity within the agricultural economy, the relative levels of crops and livestock that could be damaged by atmospheric emissions from the incinerator, and livestock which water in streams where spills could accidentally enter a watercourse at the site. Areas where agricultural activity is strong and there are large amounts of crops and livestock should be avoided in favour of areas where these indicators are weakest.

INTERPRETATION: The viability of the regional agricultural community is indicated by estimates of gross farm revenue. The likelihood of damage to crops and livestock due to atmospheric emission from the incinerator cannot be accurately estimated. However, the relative potential for economic damage can be indicated using an index based on levels of agricultural production and emission estimates. The relative number of livestock downstream from the sites that could be exposed to spills indicates a relative potential for damage.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to the farm economy
INDICATORS (1): Gross farm revenue.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: Regional Community.

DEFINITION:
Gross farm revenue generated by the regional farm community in 1981 within a 5 km radius of the site.

RATIONALE/SIGNIFICANCE: The ability to generate revenue is a basic indicator of the viability of a farming community. The tendency should be to avoid sites with high gross farm revenue in the 5 km zone.

SOURCES OF INFORMATION: 1981 Census of Agriculture, Statistics Canada, at the Enumeration Area (E.A.) level.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The community is arbitrarily defined to include farms within a 5 km radius of the site. This provides a standard area for analysis across all sites though it does not identify a natural community. Impacts on the farm economy through direct and indirect effects on local farm businesses are not expected to extend, even under worst case conditions, beyond 5 km.

While net revenue would have been a more telling indicator of economic viability, only gross revenue data were available. The estimation of net revenues from gross revenues was considered to be too problematic and too prone to error to be worth the effort.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources

FACTOR: Disruption to the farm economy

INDICATORS (2): Relative crop and livestock/poultry exposure to fugitive emissions.

CONSULTANT: Ecologistics Limited

STUDY AREA: 0-5 km emission zone.

DEFINITION: An index of relative crop and livestock exposure to fugitive emissions is used to assess the potential for economic damage. The index is determined by multiplying estimated gross annual crop and livestock/poultry revenues by emission concentration values for grid cells located in air dispersion zones about the site. The index applies to the list of sensitive crops (see Chapter 6) and to all livestock.

RATIONALE/SIGNIFICANCE: Atmospheric pollutants emitted as a result of incidents on-site can be dispersed by winds, air turbulence and diffusion. These pollutants represent a potential cause of damage to crops and livestock in the airshed about the site if they exceed critical threshold concentrations at ground level. While damage is not expected given the worst case ground level concentrations relative to crop thresholds, the sites can be compared by using an index based on agricultural production and emissions.

SOURCES OF INFORMATION: Impacts are analyzed for individual grid cells encircling and radiating out from each proposed site. Two air dispersion zones are defined for this analysis - 0-2 km and 2-5 km. Sources of information on crops and livestock for each zone are as follows:

Radius from the Site	Source of Data	Crops Data	Livestock Data
0 to 2 km's	Interviews with Farm Operators	Crops by field	Number and type of animals by farm
2 to 5 km's	i. OMAF and Agriculture Canada land use systems mapping verified by a field survey of crops	Crop systems by land use units (typically farm units)	- - -
	ii. Survey of farm organizations, farm representatives, marketing boards, and/or farm operators.	- - -	Number and type of animals by farm

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to the farm economy

INPUTS FROM OTHER CONSULTANTS: The crop and livestock values for each cell were combined with a mean concentration value by the O.R.F. to produce the indices of relative exposure.

COMMENTS/ASSUMPTIONS/LIMITATIONS: In the 0 to 2 km and 2 to 5 km zones, crops are mapped respectively within individual fields or land-use system cells. Livestock within these zones are mapped at locations corresponding to the buildings within which they are housed.

The grid cell system is superimposed on mappings of crops and livestock in the 0 to 5 km zone. Gross annual crop and livestock/poultry revenues within each grid cell are then estimated as the product of annual crop or livestock/poultry production times annual product values. Total crop and livestock/poultry values are treated separately. They cannot be added in the conventional manner since this would entail double counting of the value of feed crops used to raise local livestock. Dollar values are used here only as a means of deriving aggregate measures of these products. Crop and livestock values within grid cells are multiplied by mean grid cell concentrations of emissions and resulting products are summed across all the grid cells around a site to obtain the final index value.

The index derived for this indicator measures the relative magnitude of potential impacts but does not represent a dollar measure of damage since no specific contaminants or dose-response relationships were available.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to the farm economy

INDICATORS (3):
Relative crop and livestock/poultry exposure to stack emissions.

CONSULTANT: Ecologistics Limited

STUDY AREA: 0-20 km emission zone.

DEFINITION: An index of relative crop and livestock/poultry exposure to stack emissions is used to assess the potential for economic damage. The index is determined by multiplying estimated gross annual crop and livestock/poultry revenues by emission concentration values for grid cells located on air dispersion zones about the site. The index applies to the list of sensitive crops (see Chapter 6) and to all livestock.

RATIONALE/SIGNIFICANCE: Atmospheric pollutants emitted from the incinerator stack can be dispersed by winds, air turbulence and diffusion. These are a potential cause of damage to crops and livestock/poultry in the airshed about the site if they exceed critical threshold concentrations at ground level. While damage is not expected given the worst case ground level concentrations relative to crop thresholds, the sites can be compared using an index based on agricultural production and emissions.

SOURCES OF INFORMATION: Impacts are analyzed for individual grid cells encircling and radiating out from each proposed site. Three air dispersion zones are defined for this analysis - 0-2 km, 2-5 km and 5-20 km. Sources of information on crops and livestock for each zone are as follows:

Radius from the Site	Source of Data	Crops Data	Livestock Data
0 to 2 km's	Interviews with Farm Operators	Crops by field	Number and type of animals by farm
2 to 5 km's	i. OMAF and Agriculture Canada land use systems mapping verified by a field survey of crops	Crop systems by land use units (typically farm units)	- - -
	ii. Survey of farm organizations, farm representatives, marketing boards, and/or farm operators.	- - -	Number and type of animals by farm

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption of the Regional Farm Economy

SOURCES OF INFORMATION: continued

Radius from the Site	Source of Data	Crops Data	Livestock Data
5 to 20 km's	Enumeration Area (E.A.) data from the 1981 Census	Areas of each crop in each E.A.	Number and type of animals in each E.A.

INPUTS FROM OTHER CONSULTANTS: The crop and livestock values for each cell were combined with a mean concentration value by the O.R.F. to produce the indices of relative exposure.

COMMENTS/ASSUMPTIONS/LIMITATIONS: In the 5 to 20 km zone, crops and livestock are assumed to be evenly distributed across enumeration areas. In the 0 to 2 km and 2 to 5 km zones, crops are mapped respectively within individual fields or land-use system cells. Livestock within these zones are mapped at locations corresponding to the buildings within which they are housed.

The grid cell system is superimposed on mappings of crops and livestock from 0 to 5 km and on mappings of enumeration area boundaries from 5 to 20 km. Gross annual crop and livestock/poultry revenues within each grid cell are then estimated as the product of annual crop or livestock/poultry production times annual product values. Total crop and livestock/poultry values are treated separately. They cannot be added in the conventional manner since this would entail double counting of the value of feed crops used to raise local livestock. Dollar values are used here only as a means of deriving aggregate measures of these products. Crop and livestock values within grid cells are multiplied by mean grid cell concentrations of emissions and resulting products are summed across all the grid cells around a site to obtain the final index value.

The index derived for this indicator measures the relative magnitude of potential impacts but does not represent a dollar measure of damage since no specific contaminants or dose-response relationships were available.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to the farm economy

INDICATORS (4):
Exposure of downstream livestock.

CONSULTANT: Ecologistics Limited

STUDY AREA: Streams up to 5 km downstream of sites.

DEFINITION: The relative exposure livestock downstream of a spill from the site. This is measured by the number of stream crossings through hay and grazing systems shown on the Land Use Systems Maps.

RATIONALE/SIGNIFICANCE: There is a very low potential for spills at the site to escape into a stream and be injested by livestock drinking the downstream water. Since it cannot readily be determined which, if any animals, ingested contaminated stream water, an operator´s entire herd may be detrimentally affected.

SOURCES OF INFORMATION: Land Use Systems Mapping, O.M.A.F. and Agriculture Canada (1983 and 1984).

INPUTS FROM OTHER CONSULTANTS: Streams identified by Gartner Lee Associates.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The length of all watercourses from the site, downstream to a lake or river are considered. The Hay and Pasture Systems of O.M.A.F. and the Hay and Grazing Systems of Agriculture Canada indicate permanent pasture where livestock could be watering after a spill.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to farm traffic and cattle crossings.

STUDY AREA: Access roads.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
X		

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER
	X	

DEFINITION OF FACTOR: The factor assesses the effect that the transport of hazardous waste will have on existing farming activities along access roads. The degree of conflict between waste hauling vehicles and farming activities will be different between local and regional roads as the local roads currently carry lower traffic volumes. The local and regional roads are analyzed as separate indicators.

RATIONALE/SIGNIFICANCE OF FACTOR: There will be direct effects to existing farm traffic and cattle crossings along the regional and local access roads. Direct effects could include the interference with farm machinery, customers and service vehicles, and cattle crossings.

INTERPRETATION: The indicators will measure relative differences among sites.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to farm traffic and cattle crossings.

INDICATORS (1):
Local roads.

CONSULTANT: Ecologistics Limited

DEFINITION: The farming activities along local roads are measured by an agricultural vehicle impact index, the number of customer/service vehicle stops and the number of cattle crossings.

RATIONALE/SIGNIFICANCE: The waste treatment facility's traffic may interfere with farm-related traffic. It will increase the probability of accidents with farm vehicles and machinery, customer and service vehicles and cattle crossings, thus increasing the risk to the vehicle operator and cattle. Impacts will be greater on local roads which currently carry low traffic volumes.

SOURCES OF INFORMATION: Access road questionnaire.

INPUTS FROM OTHER CONSULTANTS: Agricultural vehicle impact index from M.M. Dillon (1985b).

STUDY AREA: Properties which abut the local access roads.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Questionnaire coverage was not complete, in which case, collected data was extrapolated to areas where information is missing in order to insure complete coverage. The agricultural vehicle impact index is calculated according to the following:

$$\text{agricultural vehicle impact index} = \text{change in traffic volume} \times \text{access road link length} \times \text{number of machinery movement (trips)}$$

$$\text{where the change in traffic volume} = \frac{\text{forecasted traffic volumes} + \text{O.W.MC. traffic volumes}}{\text{forecasted traffic volumes}}$$

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to farm traffic and cattle crossings.

INDICATORS (2):
Regional roads.

CONSULTANT: Ecologistics Limited

STUDY AREA: Properties which abut regional access roads.

DEFINITION: The farming activities along regional roads as measured by the following sub-indicators: an agricultural vehicle impact index, the number of cusomter/service vehicle stops and the number of cattle crossings.

RATIONALE/SIGNIFICANCE: The waste treatment facility's traffic may interfere with farm-related traffic. It will increase the probability of accidents with farm vehicles and machinery, customers and service vehicles and cattle crossings, thus increasing the risk to the vehicle operator and cattle. Impacts will not be as great on regional roads which carry higher traffic volumes.

SOURCES OF INFORMATION: Access road questionnaire.

INPUTS FROM OTHER CONSULTANTS: Agricultural vehicle impact index from M.M. Dillon.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Questionnaire coverage was not complete, in which case, collected data was extrapolated to areas where information is missing in order to insure complete coverage. The agricultural vehicle impact index is calculated according to the following:

$$\text{agricultural vehicle impact index} = \text{change in traffic volume} \times \text{access road link length} \times \text{number of machinery movement (trips)}$$

$$\text{where the change in traffic volume} = \frac{\text{forecasted traffic volumes} + \text{O.W.MC. traffic volumes}}{\text{forecasted traffic volumes}}$$

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

LEAD CONSULTANT: Ecologistics Limited

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to crop and livestock production.

STUDY AREA: Access roads.

FACILITY COMPONENTS AFFECTED: All.

FACTOR APPLIED FOR FOLLOWING OPTIONS:

ACCESS ROADS	RAIL ACCESS	BOUNDARY REFINEMENT
X		

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT	SITING OPTION COMPARISON	OTHER
	X	

DEFINITION OF FACTOR: Crops and livestock/poultry adjacent to an access road could be exposed to toxic chemicals in the event of an accidental spill. In addition to direct exposure to spilled toxic chemical in liquid, solid or gaseous forms, cattle watering downstream could injest chemicals spilled into a watercourse.

RATIONALE/SIGNIFICANCE OF FACTOR: Accidental spills could affect the health and/or marketability of crops and livestock that come into contact with toxic substances either directly or by exposure to contaminated water downstream from road crossings (irrigation, watering of livestock).

INTERPRETATION: The presence of crops and livestock will be compared among the sites.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING: Agricultural Resources	**FACTOR:** Disruption to crop and livestock production.
INDICATORS (1): Adjacent crops.	**CONSULTANT:** Ecologistics Limited

STUDY AREA: 800 m on either side of the local and regional access roads.

DEFINITION: Hectares of crops in an 800 m band along either side of the access roads.

RATIONALE/SIGNIFICANCE: Measures crops which could potentially be damaged by contact with contaminants that escape from the site of an accidential spill.

SOURCES OF INFORMATION: Roadside and aerial survey of crops.

INPUTS FROM OTHER CONSULTANTS: 800 m band defined by M.M. Dillon (1985b).

COMMENTS/ASSUMPTIONS/LIMITATIONS: Crops change from year to year so that data collected in one growing season may not represent a long-term average profile of cropping activity.

Crop types include small grains, row crops, hay, fruit and vegetables, nursery stock and sod.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to crop and livestock production.

INDICATORS (2):
Adjacent livestock.

CONSULTANT: Ecologistics Limited

STUDY AREA: Properties which abut the local and regional access roads.

DEFINITION:
The number of animal units livestock/poultry on farms adjacent to the access roads.

RATIONALE/SIGNIFICANCE: Identifies the livestock/poultry (both housed and pastured) which could be damaged by contact with contaminants that escape from the site of an accidental spill.

SOURCES OF INFORMATION: Access road questionnaire data.

INPUTS FROM OTHER CONSULTANTS: None.

COMMENTS/ASSUMPTIONS/LIMITATIONS: Livestock populations change from season to season and from year to year, so that data collected at a point in time may not characterize long-term conditions. Moreover, questionnaire coverage may be incomplete thus necessitating the use of existing information to fill-in for missing data. Livestock are measured using an animal unit conversion for comparing different livestock types. See Page A-50 for details.

OWMC PHASE 4A - FACTORS FOR SITE SELECTION

FACTOR GROUPING:
Agricultural Resources

FACTOR: Disruption to crop and livestock production.

INDICATORS (3):
Downstream livestock.

CONSULTANT: Ecologistics Limited

STUDY AREA: Region.

DEFINITION: The relative exposure of downstream livestock to potential spills into watercourses crossed by access roads.

RATIONALE/SIGNIFICANCE: Measures the relative amount of livestock that could be potentially damaged by injesting contaminants that escape into a stream from the site of an accidental spill.

SOURCES OF INFORMATION: Land Use Systems Mapping, O.M.A.F. and Agriculture Canada (1983 and 1984).

INPUTS FROM OTHER CONSULTANTS: Streams identified by Gartner Lee Associates.

COMMENTS/ASSUMPTIONS/LIMITATIONS: The length of the watercourses from the access road downstream to a lake or river are considered. The hay and pasture systems of O.M.A.F. and the Hay and Grazing Systems of Agriculture Canada indicate permanent pasture where livestock could be watering after a spill.

APPENDIX B

DATA COLLECTION AND COMPILATION

Outlined in this appendix are details of the data collection and compilation procedures employed in the Phase 4A analysis.

Discrete data collection efforts were mounted for each major agricultural study area. Data collection and compilation methods are, therefore, described according to study area. The principal data sources for each study area were as follows:

i. Site and Site Vicinity
   - detailed interviews with farm operators
   - detailed on-site soil surveys

ii. Access Roads
   - interviews with farm operators along local and regional access roads
   - aerial and roadside (windshield) surveys of crops
   - estimates of downstream livestock from existing land use systems maps

iii. Air Dispersion Zones
   - farm interviews (0-2 km)
   - meetings with local farmers, OMAF staff; marketing board data; OMAF and Agriculture Canada land use systems maps (2-5 km)
   - Census of Agriculture, 1981 (5-20 km)

2.0 DATA COLLECTION FOR THE SITE AND VICINITY STUDY AREAS

2.1 DEFINITION OF SITE AND SITE VICINITY STUDY AREAS

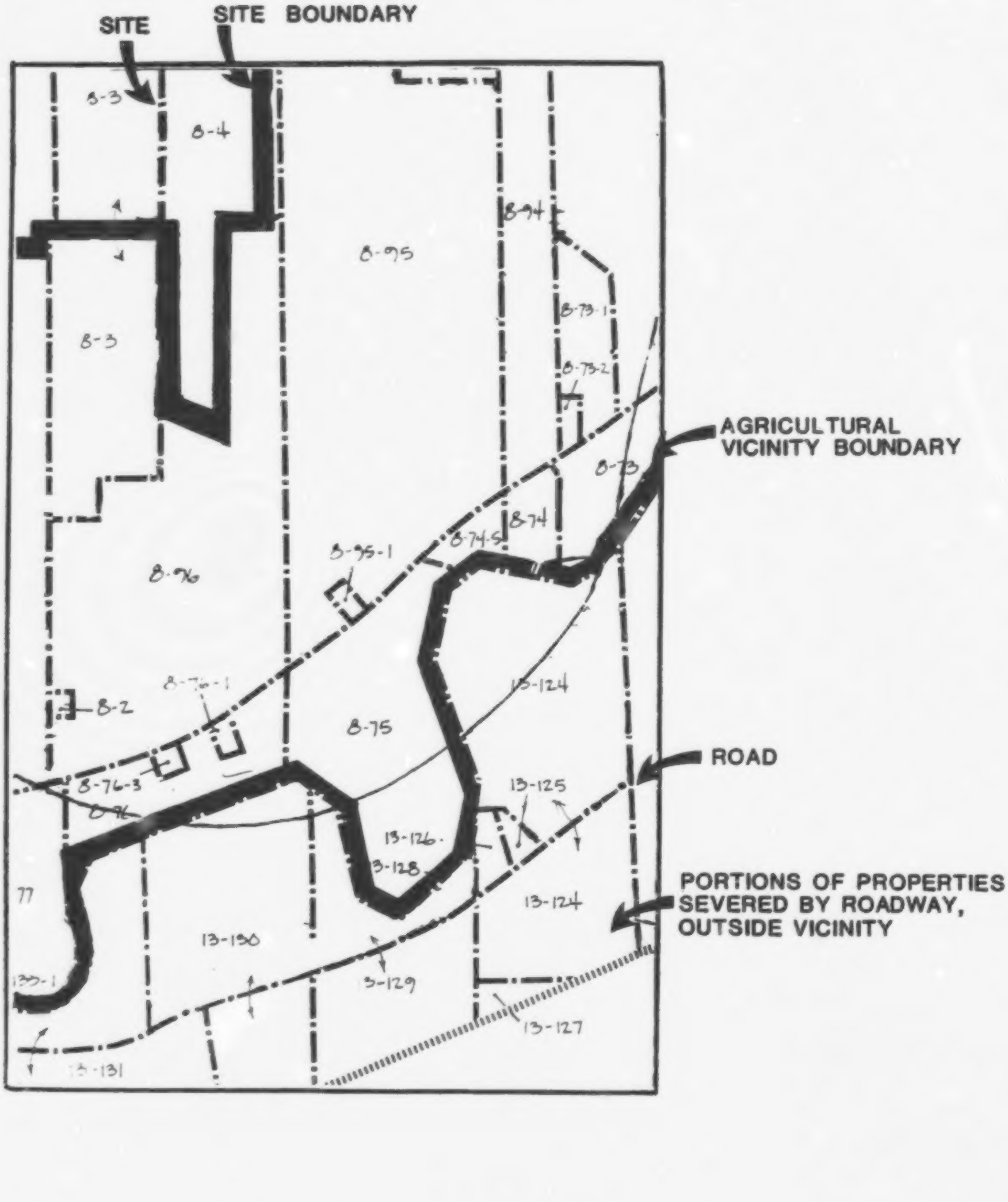
The site study area refers to the lands that would be acquired for the installation of an O.W.M.C. waste management facility.

The site vicinity study area is a zone in close proximity to the site where there is potential for direct impacts related to such matters as property values, noise, traffic, nuisances, air emissions as a result of on-site facilities and activities. For data collection purposes, an agricultural site vicinity extending approximately 2 km from the site center was established. This zone was divided into two sub-zones: the adjacent and the non-adjacent vicinity.

The adjacent vicinity includes farm properties adjacent or immediately across the road from a site. The non-adjacent vicinity extends from these properties to the outer limit of the vicinity zone (2 km±). The two sub-zones were created because the adjacent farm operations will be more susceptible to a broader range of direct impacts than will the non-adjacent farm operations.

The site vicinity boundaries encompassed complete property holdings. Complete property holdings are single properties or contiguous parcels owned by the same person, persons, company or agency. Contiguous parcels under common ownership were included as single holdings because they are no longer considered to be severed once they have a common owner. On the other hand, single properties or two contiguous properties that are physically divided by a linear property such as a road right-of-way are considered to be severed. Under such circumstances, the parcel within 2 km would be included and the parcel beyond excluded. This is illustrated in Figure B-1.

FIGURE B-1 ILLUSTRATION OF PROPERTIES SEVERED BY THE AGRICULTURAL VICINITY STUDY AREA


SITE
SITE BOUNDARY
AGRICULTURAL VICINITY BOUNDARY
ROAD
PORTIONS OF PROPERTIES SEVERED BY ROADWAY, OUTSIDE VICINITY
8-3
8-4
8-95
8-94
8-73-1
8-73-2
8-3
8-73
8-74
8-74-5
8-95-1
8-96
8-76-1
8-2
8-75
13-124
8-76-3
8-76
13-125
13-126
13-128
77
13-124
13-130
133-1
13-129
13-127
13-131

Adjustments to the perimeter of the study area were made in order to include peripheral properties that seemed sufficiently close to warrant an interview or exclude extensive non-agricultural properties such as the Cyinamide and Conservation Authority lands near LF-1E and PI-27E. The boundaries of the study areas are shown on maps 9 to 16 in the map portfolio. The agricultural study area is similar to the O.W.M.C. walk and talk study area.

2.2 INTERVIEWS WITH FARM OPERATORS

2.2.1 Introduction

Interviews with farm operators were conducted to gather a complete set of site-specific data describing agricultural activity in the site and vicinity study areas. Data collection focused on the following:

- the number of farm businesses operating in the study area;
- the characteristics of farmlands and buildings;
- the characteristics of each farm business (type and tenure);
- the types and areas of crops grown;
- livestock numbers housed and/or pastured;
- agricultural product sales;
- extent of employment generated by the farm businesses.

The interviews were undertaken in conjunction with the O.W.M.C. `Walk and Talk´ program. Pre-testing of the questionnaire was carried out prior to the start-up of the `Walk and Talk´ program.

2.2.2 Questionnaire Design

It was recognized that the geographic location of farm operations relative to the study area boundaries could encompass the following and that the survey of operators should include each:

1. farm operations that are completely located within the study areas;
2. farm operations with land both within and outside the study areas; and
3. farm operations with headquarters outside the areas but with some land within the study area.

A distinction was made between those properties located on-site or adjacent to the site and those in the remainder of the vicinity. A more detailed questionnaire was employed for properties in the former two areas to obtain a thorough description of activities in the areas of greatest impact potential. The questionnaires for the on-site and adjacent farm properties are shown in Figure B-2, and for the non-adjacent farm properties in Figure B-3. The principal distinction between the two is that farm revenue data and farm building characteristics and uses are requested only for the site and adjacent properties (questions 7 and 10 of Figure B-2).

Most of the terms used in the questionnaire are self-explanatory. Key terms are defined below:

Full-time farmer* - self-employed farm operator whose primary economic activity is farming

Part-time farmer* - self-employed farm operator whose primary economic activity is not farming

Off-farm employment - employment in activities not directly related to the farm operation

Hobby farmer* - farm operator whose interest in farming is not primarily economic in nature

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*Respondents assigned themselves to one of these classes of operator.

FIGURE B-2 Interview Identification Number: ______

OWMC PHASE 4A

INTERVIEW FORM
FARM PROPERTIES ON SITE AND ADJACENT TO THE CANDIDATE SITES

THE PURPOSE OF THE INTERVIEW

The purpose for this interview is to collect information from farm operators on-site and adjacent to OWMC's candidate sites. This information will be used to develop evaluation criteria to compare the candidate sites. In combination with other information, it will help us to eliminate unsuitable sites and select a preferred site or sites for OWMC waste treatment facilities.

Site: _______ Date: __________________ Time: _____________

Interviewer(s): ____

Respondent's Name: ____

Address: ____

____

____

Lot: _________ Concession: _________

Township: ____________________________

Telephone: ___________________________

Property is: On Site ☐ Assessment Roll Numbers _________
____
____
____

Adjacent ☐ Assessment Roll Numbers _________
____
____
____

Vicinity ☐ Assessment Roll Numbers _________
____
____
____

(INTERVIEWER NOTE: Write name of interviewee on relevant properties shown on the map.)

INTERVIEWER NOTE: The respondent should be told that this information will be used in a discreet manner and presented in aggregate form only. OWMC will not volunteer, disclose or attribute information of a personal, confidential or private nature; however, the information might become subject to disclosure if OWMC is so ordered by the hearing officers.

Also, the respondents should be told that we appreciate their cooperation and they need not feel obligated to answer all or any questions.

(INTERVIEWER NOTE: All references to "on-site" properties, apply as well to properties in Vicinity Zones I, II and III.)

Interview Identification Number: ______

AGRICULTURE

This section of the interview includes a number of questions concerning the operation of your farm. We are interested in such things as acreage farmed, the type and number of livestock, the type and use of farm buildings, farm revenues and cropping patterns. This information will help us to determine the potential loss or disruption to agricultural operations that may result from the development of an OWMC facility in this area. Information gathered will not be used in any appraisal of this particular property. The data are intended strictly for the sole use of the consultants and OWMC staff in evaluating the candidate sites.

A. General (INTERVIEWER NOTE: This section applies to the whole farm operation.)

1. Would you describe yourself as a...
(Interviewer: Read list; check one only)

Full-time farmer with no off-farm employment ☐

Full-time farmer with part-time off-farm employment ☐

Full-time farmer with full-time off-farm employment ☐

Part-time farmer with no off-farm employment ☐

Part-time farmer with part-time off-farm employment ☐

Part-time farmer with full-time off-farm employment ☐

Hobby farmer ☐

Other, specify ______________________________

2. How many acres do you farm in total? ______ acres

How many acres are tillable? ______ acres

3. How much of the land you farm is owned by you? ___ acres
rented by you? ___ acres

4. Is your farm property located entirely on the site?

Yes ☐ No ☐

(If no) How many acres are located off-site? ______ acres

5. How would you describe the main farming activities taking place on your farm? (If more than one, obtain an indication of relative importance.)

a. Cash Crop ☐
b. Mixed Crop ☐
c. Dairy ☐
d. Beef Cow-Calf ☐
e. Beef Feedlot ☐
f. Sow - Farrow to Finish ☐
g. Sow - Farrow to Weaner ☐
h. Feeder Hogs ☐
i. Poultry ☐
j. Other (specify) ______________________

6. How many people are employed full-time and part-time on this farm on an annual basis?

Full-time ☐ ______ man months per year
Part-time ☐ ______ man months per year

FIGURE B-2 cont'd

Interview Identification Number: ______

(INTERVIEWER NOTE: The respondent is under no obligation to answer revenue and income questions. DO NOT PUSH.)

B: Farm Revenues
(To be completed for the whole farm operation)

7. What farm products did you market in 1983? List below the products and quantities sold and the approximate gross revenues obtained.

Farm Product Type	Product Sold	Quantity Sold (indicate units)	Approximate Gross Revenues Obtained
sale of livestock	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______
sale of livestock products, i.e., milk, eggs, etc.	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______
sale of field crops, i.e., corn, soybeans, grain, hay	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______
sale of fruits or vegetables	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______
Other Products	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______

Total Approximate Gross Farm Revenue ______

FIGURE B-2 cont'd

Interview Identification Number: ____

C: Farm Livestock

(INTERVIEWER NOTE: One form is to be completed for the whole farm operation; an additional form is to be completed for each affected on-site property.)

______ Off-Site Property ______ On-Site Property

Assessment Roll Number ____________

8. Have you, at any time over the last 12 months, had livestock as part of your farm operation?

Yes No If no, go to Section D

9. What types of livestock and how many currently are located on your farm, and what types and how many are specifically located on the site? (List below.)

Livestock Type	Total No. of Head	No. on the Site Property	Livestock Pastured Yes	Livestock Pastured No
Dairy Cows	____	____	☐	☐
Dairy cows (less than 1 year)	____	____	☐	☐
Replacement heifers (older than 1 year)	____	____	☐	☐
Beef cows	____	____	☐	☐
Beef calves (less than 1 year)	____	____	☐	☐
Replacement heifers (older than 1 year)	____	____	☐	☐
Feeder cattle	____	____	☐	☐
Bulls	____	____	☐	☐
Sows	____	____	☐	☐
Boars	____	____	☐	☐
Replacement gilts	____	____	☐	☐
Pigs (less than 2 months)	____	____	☐	☐
Feeder pigs (older than 2 months)	____	____	☐	☐
Layer hens	____	____	☐	☐
Broilers	____	____	☐	☐
Horses	____	____	☐	☐
Other (specify) ____________	____	____	☐	☐
____________	____	____	☐	☐
____________	____	____	☐	☐

FIGURE B-2 cont'd

Interview Identification Number: ______

D. Building Characteristics and Capacity Utilization

(INTERVIEWER NOTE: This section is to be completed for each on-site property.)

Assessment Roll Number ______

10. For each of the farm buildings located on this farm property please provide the following information. (Do not include residences.)

Building Type/Description	Suitable for Livestock		Livestock Type Currently Housed		Full Capacity No. of Head
	Yes	No	Type	No. of Head	
______	☐	☐	______	______	______
______	☐	☐	______	______	______
______	☐	☐	______	______	______
______	☐	☐	______	______	______
______	☐	☐	______	______	______
______	☐	☐	______	______	______
______	☐	☐	______	______	______
______	☐	☐	______	______	______

(INTERVIEWER: Rate the building complex:

Very Good ☐ Good ☐ Fair ☐ Poor ☐

FIGURE B-2 cont'd Interview Identification Number: ______

E: Use of the Property
(This section is to be completed for each on-site property.)

Assessment Roll Number __________

11. How large is this farm property? ______ acres

12. Is the property owned or rented by you?

Owned ☐ Rented ☐ (If rented, go to Question 14)

(If rented) Who is the registered owner?

Name: ______________________________

Address: ______________________________

____

Telephone: ( ) ______________________________

What is the term of the lease? ______ years

13. Do you rent land to anyone else?

Yes ☐ No ☐

If yes, how many acres? ______ acres

Who rents the land?

Name: ______________________________

Address: ______________________________

Telephone: __________________

What is the term of the lease? ______ years

14. Are your headquarters, that is your home and your main farm buildings, located on this farm property?

Yes ☐ No ☐

(If no) Where are your main buildings located?

Municipality ______________
Lot ______________
Concession ______________

15. How many acres are tillable? ______ acres

16. How many acres are tile drained? ______ acres

(INTERVIEWER: Mark on the map where tile drains are located and their outlet.)

17. What proportion of your total gross farm revenue do you estimate is generated by this property? ________%

18. Please mark on the map the fields you are currently using for crops. (Interviewer: number each of the fields)

19. Please mark the areas in permanent or rough pasture. (Interviewer: locate on map)

20. How many acres are in permanent or rough pasture? ______ acres

21. How many acres are in swamp? ______ acres
upland forest? ______ acres

22. Please mark the areas which are in upland forest or in swamp.

FIGURE B-2 cont'd

Interview Identification Number: ______

(E. Continued)

23. For each field located on this property please you provide the following information.

Field #	Crop (list below)	1984 Acreage	Crop (list below)	1983 Acreage	Crop Mentioned in 1983 or 1984	5 Year Average Yield	Unit of Measurement Bushels Tons	Crop Sold	Crop Fed
1.								☐	☐
2.								☐	☐
3.								☐	☐
4.								☐	☐
5.								☐	☐
6.								☐	☐
7.								☐	☐
8.								☐	☐
9.								☐	☐
10.								☐	☐

Total Acres______

FIGURE B-3 Interview Identification Number: ______

OWMC PHASE 4A

INTERVIEW FORM
FARM PROPERTIES IN THE VICINITY OF THE CANDIDATE SITES
(FROM ADJACENT PROPERTIES TO 2000M)

THE PURPOSE OF THE INTERVIEW

The purpose for this interview is to collect information from farm operators on-site and adjacent to OWMC's candidate sites. This information will be used to develop evaluation criteria to compare the candidate sites. In combination with other information, it will help us to eliminate unsuitable sites and select a preferred site or sites for OWMC waste treatment facilities.

Site: ________ Date: ____________________ Time: ______________

Interviewer(s): ____

Respondent's Name: ____

Address: ____

____

____

Lot: _________ Concession: _________

Township: ______________________________

Telephone: ______________________________

Relevant Properties: In Vicinity Assessment Roll Numbers _________

____

____

____

(INTERVIEWER NOTE: Write name of interviewee on relevant properties shown on the map.)

INTERVIEWER NOTE: The respondent should be told that this information will be used in a discreet manner and presented in aggregate form only. OMWC will not volunteer, disclose or attribute information of a personal, confidential or private nature; however, the information might become subject to disclosure if OWMC is so ordered by the hearing officers.

Also, the respondents should be told that we appreciate their cooperation and they need not feel obligated to answer all or any questions.

(INTERVIEWER NOTE: For all land parcels located between the site acquisition boundary and the 1000m line (i.e., Site Vicinity II), complete _only_ Sections A, C and E of the Agricultural component of the questionnaire. All references to "on-site" properties, apply as well to properties in Vicinity Zones I and II.)

FIGURE B-3 cont'd   Interview Identification Number: ______

AGRICULTURE

This section of the interview includes a number of questions concerning the operation of your farm. We are interested in such things as acreage farmed, the type and number of livestock, the type and use of farm buildings, farm revenues and cropping patterns. This information will help us to determine the potential loss or disruption to agricultural operations that may result from the development of an OWMC facility in this area. Information gathered will not be used in any appraisal of this particular property. The data are intended strictly for the sole use of the consultants and OWMC staff in evaluating the candidate sites.

A. General (INTERVIEWER NOTE: This section applies to the whole farm operation.)

1. Would you describe yourself as a...
(Interviewer: Read list; check one only)

Full-time farmer with no off-farm employment ☐
Full-time farmer with part-time off-farm employment ☐
Full-time farmer with full-time off-farm employment ☐
Part-time farmer with no off-farm employment ☐
Part-time farmer with part-time off-farm employment ☐
Part-time farmer with full-time off-farm employment ☐
Hobby farmer ☐
Other, specify ______________________

2. How many acres do you farm in total? ______ acres

How many acres are tillable? ______ acres

3. How much of the land you farm is owned by you? ___ acres
rented by you? ___ acres

4. Is your farm property located entirely in the vicinity?

Yes ☐   No ☐

(If no) How many acres are located elsewhere? ______ acres

5. How would you describe the main farming activities taking place on your farm? (If more than one, obtain an indication of relative importance.)

a. Cash Crop ☐
b. Mixed Crop ☐
c. Dairy ☐
d. Beef Cow-Calf ☐
e. Beef Feedlot ☐
f. Sow - Farrow to Finish ☐
g. Sow - Farrow to Weaner ☐
h. Feeder Hogs ☐
i. Poultry ☐
j. Other (specify) ______________________

6. How many people are employed full-time and part-time on this farm on an annual basis?

Full-time ☐ ______ man months per year
Part-time ☐ ______ man months per year

FIGURE B-3 cont'd

Interview Identification Number: ______

B: Farm Livestock

(INTERVIEWER NOTE: One form is to be completed for the whole farm operation; an additional form is to be completed for each affected property.)

______ Vicinity Property ______ Whole Farm

Assessment Roll Number ______________

7. Have you, at any time over the last 12 months, had livestock as part of your farm operation?

Yes ☐ No ☐ If no, go to Section D

8. What types of livestock and how many currently are located on your farm, and what types and how many are specifically located on the site? (List below.)

Livestock Type	Total No. of Head	No. on the Vicinity Property	Livestock Pastured Yes	Livestock Pastured No
Dairy Cows	______	______	☐	☐
Dairy cows (less than 1 year)	______	______	☐	☐
Replacement heifers (older than 1 year)	______	______	☐	☐
Beef cows	______	______	☐	☐
Beef calves (less than 1 year)	______	______	☐	☐
Replacement heifers (older than 1 year)	______	______	☐	☐
Feeder cattle	______	______	☐	☐
Bulls	______	______	☐	☐
Sows	______	______	☐	☐
Boars	______	______	☐	☐
Replacement gilts	______	______	☐	☐
Pigs (less than 2 months)	______	______	☐	☐
Feeder pigs (older than 2 months)	______	______	☐	☐
Layer hens	______	______	☐	☐
Broilers	______	______	☐	☐
Horses	______	______	☐	☐
Other (specify) ______________	______	______	☐	☐
______________	______	______	☐	☐
______________	______	______	☐	☐

FIGURE B-3 cont'd **Interview Identification Number:** ________

C: Use of the Property
(This section is to be completed for each property that falls within the area from the adjacent properties to 2000 metres of the site.)

Assessment Roll Number __________

9. How large is this farm property? ______ acres

10. Is the property owned or rented by you?

Owned ______ Rented ______ (If rented, go to Question 14)

(If rented) Who is the registered owner?

Name: ____________________

Address: ____________________

____

Telephone: ( ) ____________________

What is the term of the lease? ______ years

11. Do you rent land to anyone else?

Yes ☐ No ☐

If yes, how many acres? ______ acres

Who rents the land?

Name: ____________________

Address: ____________________

Telephone: ____________________

What is the term of the lease? _______ years

12. Are your headquarters, that is your home and your main farm buildings, located on this farm property?

Yes ☐ No ☐

(If no) Where are your main buildings located?

Municipality ____________________
Lot ____________________
Concession ____________________

13. How many acres are tillable? _______ acres

14. How many acres are tile drained? _______ acres

(INTERVIEWER: Mark on the map where tile drains are located and their outlet.)

15. What proportion of your total gross farm revenue do you estimate is generated by this property? __________%

16. Please mark on the map the fields you are currently using for crops. (Interviewer: number each of the fields)

17. Please mark the areas in permanent or rough pasture. (Interviewer: locate on map)

18. How many acres are in permanent or rough pasture? ______ acres

19. How many acres are in swamp? ______ acres
upland forest? _____ acres

20. Please mark the areas which are in upland forest or in swamp.

FIGURE B-3 cont'd

Interview Identification Number: ______

(C. Continued)

21. For each field located on this property please you provide the following information.

Field #	Crop (list below)	1984 Acreage	Crop (list below)	1983 Acreage	Crop Mentioned in 1983 or 1984	5 Year Average Yield	Unit of Measurement Bushels Tons	Crop Sold	Crop Fed
1.								☐	☐
2.								☐	☐
3.								☐	☐
4.								☐	☐
5.								☐	☐
6.								☐	☐
7.								☐	☐
8.								☐	☐
9.								☐	☐
10.								☐	☐
Total Acres	______								

Tillable acres - land which is or can be cultivated with contemporary farm machinery without investments in clearing, stone removal, etc.

Owned land - land legally owned by the farm operator

Rented land - land owned by someone other than the farm operator and used by the farm operator generally in return for an annual rental fee. Property owned by the father and worked by the son was considered rented land.

Cash crop - farm operation based on sale of field crops (corn, grains, beans, etc.).

Mixed crop - mixed farming operation involving both cash crop sales and livestock sales.

Dairy - farm operation selling primarily milk.

Beef, Cow-calf - farm operation selling primarily weaned beef calves.

Beef feedlot - farm operation selling primarily steers and heifers for slaughter and replacing these with purchased calves.

Sow, farrow to weaner - farm operations selling weaner pigs.

Feeder hogs - farm operations buying weaner pigs and selling finished hogs for slaughter.

Poultry - farm operations selling eggs or slaughter chickens

On-site - for purposes of the survey, this was interpreted as the study area shown by property boundaries on photomosaic base maps (1:10,000 scale).

Headquarters - home and main farm buildings.

The questionnaire was designed to be used with a corresponding 1:10,000 scale map of each site showing property boundaries, lot and concession numbers, local and regional road names and the study area boundary. Ministry of Revenue Regional Assessment Offices provided property boundary data current to December, 1983. These maps were used during the interview to locate farm properties, farm buildings, cropped fields, pasture, forest and swamp, tile drains and ponds.

Questions dealing with the physical environment (Gartner Lee Associates, 1985a and 1985c) and the respondent's socio-economic profile (I.E.R., 1985) were included with the agricultural questionnaire. Details on these questions are discussed in companion technical reports by the relevant consultants.

In addition to the main sections that dealt with agriculture and other aspects of the impacted environment, a preliminary section provided information on site code, name and address of the respondent, property assessment roll numbers, interviewer's name and interview date and time. Two final pages documented interview completion time, requests for follow-up from the respondent, and permission granted by the respondent for farm buildings to be photographed and on-site soils to be sampled.

2.2.3 Compilation of Interview Lists and Base Maps

The compilation of interview lists involved the identification of property owners for each study area. Ontario Ministry of Revenue Assessment Roll files supplied this information. These files were reviewed at regional assessment offices in Milton and St. Catharines. Data obtained from these lists included:

- name and address of the legal owner of each property,
- name of tenant (where available)
- property assessment role number,
- property size
- property use (farm/non-farm)

In addition, copies were obtained of current assessment roll maps covering each study area (1:2,000 scale). These maps, showing property boundaries and assessment roll numbers, were redrafted for each study area at a 1:10,000 scale and superimposed on 1:10,000 Ontario Base Maps. These 1:10,000 scale "line-base" property maps provided a ready means of identifying farm properties and tracking the coverage of interviews.

Property boundaries were also drawn on 1:10,000 photomosaic base maps for use in compiling cropping data.

The farm/non-farm designation provided by assessment roll files formed the basis for the identification of farm properties where interviews would be undertaken. All properties below 5 ha in size were initially assumed to be non-farm properties, though certain of these were subsequently identified as farm properties through the interviews by I.E.R. A two page agricultural questionnaire was used for these properties (Figure B-4).

2.2.4 Scheduling and Co-ordination of Interviews

The interviews were undertaken from June 21 to the end of August, 1984. The scheduling of interviews was arranged by the O.W.M.C. Each property owner was mailed a complete copy of the questionnaire together with a letter explaining the purpose of the interview. Owners of properties on-site or adjacent to the site received the detailed questionnaire. The mailing list was compiled from the Ministry of Revenue assessment role information. O.W.M.C. schedulers phoned individuals who were sent the questionnaire to arrange a date and time for an interview.

Field offices were established in Welland and Milton. Each day farm interviewers and field co-ordinators contacted O.W.M.C. schedulers from these offices to obtain scheduled interviews. The O.W.M.C. scheduler provided the following information which the interviewer recorded on a scheduling form:

- name, address and phone number of interviewee,
- size and property number of each property known to be owned or rented by the interviewee,
- tenant name, address and phone number (if the land was farmed by a tenant),
- date and time of the interview, and
- road directions to the interviewee's home.

FIGURE B-4 QUESTIONS FOR LANDOWNERS "FARMING" PARCELS LESS THAN 5 HECTARES

Assessment Roll No: ____________________

Name: ____
Address: ____
Phone No.: ____

Size of Property: ____

Area Cultivated in 1984? ________________ acres ________________ ha

Permanent Pasture? ________________ acres ________________ ha

Other: ______________ ________________ acres ________________ ha
______________ ________________ acres ________________ ha

If land is cultivated, what crops are being grown in 1984?

Crop	Acres	Hectares

Do you have any livestock on your property at present?

Yes ______ No ______

June 6, 1984

FIGURE B-4 - cont'd
Questions for Landowners "Farming" Parcels Less than 5 Hectares - cont'd

If yes, what types and numbers of livestock are on the property?

Livestock Type	Number

What is your estimate of the value of agricultural products produced on your property in 1983? ______________________________

What proportion of your total 1983 income was represented by the value of agricultural products produced on your property in 1983? ____________

Interviews were scheduled at a rate of three to five per day per interviewer. The scheduler did not attempt further contact with any property owner who refused to be interviewed when first contacted.

Many property owners indicated that they do not farm their property but rent it to area farmers. If the property owner identified the tenant(s), arrangements were made from the field office to interview any tenant that was farming the property. In many cases during the interview, it was discovered that the farmer rented and farmed one or more properties in the study area not already noted on the scheduling form. The interviewer gathered all pertinent agricultural information for each property in the course of the interview with such individuals.

Despite the initial letter and a series of follow-up phone calls, a few property owners and/or tenants could not be located. In these cases the study team consulted aerial photographs to determine the field size, making a subsequent visual field check to ascertain what crops were growing on the property in 1984.

After each interview, the interviewer plotted each property covered by that interview on a property base map and recorded the respondent's name and tenure status. This map provided a visual overview of the survey coverage and a means of cross-checking properties with owner and/or tenant names.

2.2.5 Interviewing Procedures

Interviewers were equipped with a scheduling form, blank questionnaire, and a photo-base property map for each interview.

After preliminary introductions, interviewers reviewed the nature and purpose of the interview with the respondent and assured the respondent that he/she was under no obligation to answer the questions. Also, each respondent was assured that the information on his/her form would remain confidential and that only aggregated data would be used. The interviewer also verified the respondent`s name and address.

The interviewer then led the respondent through the questionnaire recording the responses to each question. For all but one item on the questionnaire, the respondent provided all of the information recorded. This includes, for example, the respondents classification as a full-time, part-time or hobby farmer (Question 1). The exception was the rating of farm buildings (discussed below). Where more than one property was farmed by the operator, the interviewer would record information for Sections C, D and E on separate sheets for each property.

For Section E, areas in crops and other uses (forest, buildings, etc.) were also marked on a photo-base property map. The interviewer numbered the fields on the questionnaire and on the map to enable subsequent data compilation.

Once all questions were answered, the interviewer requested the respondent´s permission to photograph any farm buildings on the property. In the case of on-site properties, the respondent was asked permission for a researcher to carry out a soil survey at a later date. The interviewer´s response to these requests was recorded.

The interviewer then completed the last sheet of the questionnaire recording completion time and follow-up requests. Photographs were then taken of each farm building located on properties found on-site or adjacent to the site. The interviewer then assigned a preliminary rating of "very good", "good", "fair" or "poor" for each photographed building complex.

2.2.6 Interview Follow-up Procedures

As noted above, once an interview was completed, properties associated with that interview were checked off on a property base map located in the field office. Crop information on the interviewer's working map was transferred to a second summary base map in the field office. The coding convention for field crops is shown in Figure B-5. Page B-89 shows the crop codes used on these maps.

Completed questionnaires and the scheduling forms were returned to O.W.M.C. each week. O.W.M.C., in turn, copied the questionnaires and sent the agricultural section back to Ecologistics Limited. Field office maps were sent to Ecologistics Limited to assist in data compilation.

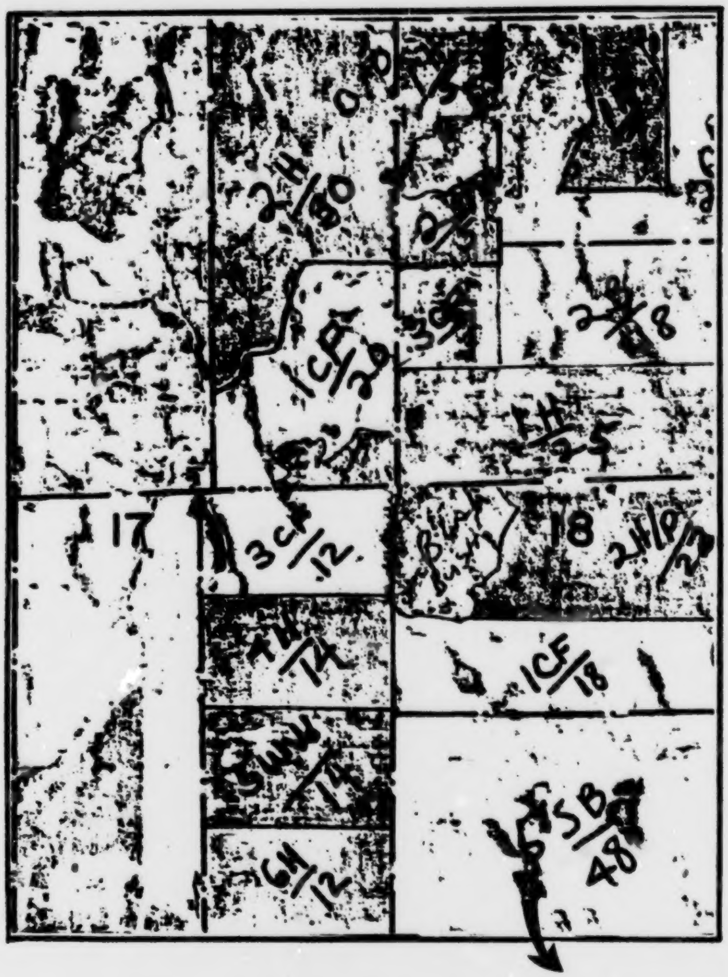
2.2.7 Survey Coverage

Overall coverage of farmed parcels is shown in Table B-1. During the field survey, every attempt was made to contact all farm operators regardless of tenancy and in most cases it was possible to contact them. Accurate counts of the number of farm operators within the study areas are not available as tenants are not always identified on assessment roll information. Therefore, comparison of the number of farmed parcels accounted for during the survey with the number of farmed properties identified by the assessment rolls was used to determine the survey coverage. As shown in Table B-1, complete coverage was obtained for LF-3C, LF-9C and PI-27E. For the remaining sites, a small number of parcels were not covered.

2.2.8 Data Coding and File Structure

All questionnaire information was transferred to coding sheets for keypunching into a computerized data base. Figure B-6 shows a sample coding sheet. The first coding sheet described the entire farm operation

FIGURE B-5 FIELD OFFICE CROP MAP (DETAIL)


2H/80
1CF/20
17
3C/12
18
4H/14
5WW/14
6H/12
1CF/18
5SB/48

SAMPLE CODING

field number → $\frac{\text{5 SB}}{48}$ ← crop type
48 ← acreage

TABLE B-1

SURVEY COVERAGE OF FARMED PARCELS WITHIN THE SITE AND VICINITY

Site	Number of Farm Operators Interviewed	Number of Farmed Parcels in the Study Area*	Number of Farmed Parcels Covered By Questionnaires	Number of Farm Properties Not Covered by Questionnaires+
LF-2N	14	44	37	7
PI-13N	36	75	64	11
PI-1N	35	84	73	11
LF-4N	30	84	78	6
LF-3C	59	106	106	0
LF-9C	44	74	74	0
PI-27E	18	44	44	0
LF-1E	47	91	84	7

* excludes idle land.

+ includes properties known to be farmland where owners refused to be interviewed or could not be contacted.

FIGURE B-6 O.W.M.C. - CODING SHEET - GENERAL FARM

CARD 1

	CARD #	LOCT'N CODE	I.D. #	SITE I.D.
	0 1			
COL.	1 2	3	4 9	10 15

	RESPONDENT NAME	Q.1	Q.2 (TOTAL)
COL.	16 35	36	37 41

	Q.2 (TILLABLE)	Q. 3 (OWNED)	Q.3 (RENTED)	Q.4	Q.4 (ACRES)	Q.5
						63 __ 64 __
COL.	42 46	47 51	52 56	57 58	62	

	Q.6(FULL)	Q.6(PART)	Q.7 (GROSS REVENUE)	Q.8		RESP. NO.
					(77 BLANK)	
COL.	65 66	67 68	69 75	76		78 80

CARD 2

	CARD #	DAIRY (>1)	DAIRY (< 1)	HEIFERS	BEEF COWS	BEEF CALVES
	0 2					
COL.	1 2	3 6	7 10	11 14	15 18	19 22

	HEIFERS (BEEF)	FEEDERS	BULLS	SOWS	BOARS	GILTS
COL.	23 26	27 30	31 34	35 38	39 42	43 46

	PIGS (<2 MO.)	FEEDER PIGS	LAYERS	BROILERS	HORSES	OTHER
COL.	47 50	51 54	55 59	60 64	65 67	68 71

	RESP. NO.
(72-77 BLANK)	
	78 80

FIGURE B-6 cont'd

OWHC - CODING SHEET - PROPERTY SPECIFICS

CARD 3

	CARD #	PROP. CODE	DAIRY (>1)	DAIRY (<1)	HEIFERS	BEEF COWS
	0 3					
COL.	1 2	3 7	8 11	12 15	16 19	20 23

	BEEF CALVES	HEIFERS (BEEF)	FEEDERS	BULLS	SOWS	BOARS
COL.	24 27	28 31	32 35	36 39	40 43	44 47

	GILTS	PIGS (< 2 MO.)	FEEDER PIGS	LAYERS	BROILERS	HORSES
COL.	48 51	52 55	56 59	60 64	65 69	70 72

	OTHER	(77 BLANK)	RESP. NO.
COL.	73 76		78 80

CARD 4

	CARD #	Q.10	PROP. SIZE	Q.12	Q.13	ACRES RENTED	Q.14	Q. 15 (TILLABLE)
	0 4							
COL.	1 2	3	4 8	9	10	11 15	16	17 21

	Q.16 (TILED)	Q.17 (INCOME $)	Q.20 (PASTURE)	Q.21 (SWAMP)
COL.	22 26	27 33	34 38	39 43

	Q.21 (FOREST)	Q.23CORN	YIELD	BARLEY	YIELD
COL.	44 48	49 53	54 56	57 61	62 64

	SOYBEANS	YIELD		RESP. NO.
COL.	65 69	70 72	73 77	78 80

CARD 5

	CARD #	WINTER WHEAT	YIELD	HAY	YIELD	OATS
	0 5					
COL.	1 2	3 7	8 10	11 15	16 18	19 23

	YIELD	ALFALFA	YIELD	CLOVER/TREFOIL SEED	YIELD	FRUIT TREES
COL.	24 26	27 31	32 34	35 39	40 42	43 47

	YIELD		YIELD		YIELD	TOTAL CROPS
COL.	48 50	51 55	56 58	59 63	64 66	67 71

	(72-77 BLANK)	RESP. NO.
COL.		78 80

including total acreages and livestock numbers as well as the respondent's name and farm description. A second coding sheet was completed for each individual property in the study area. This coding sheet documented the size of the property, the area dedicated to each crop type and the numbers of livestock by type.

No interpretations or manipulations were made with questionnaire data prior to coding. Therefore, computer files contain the raw questionnaire data. The only additions were descriptions of property location in the study area, a site code and a siting option code. The property location code indicated whether the property was:

- on site
- in the site vicinity and adjacent to the site
- in the site vicinity but not adjacent to the site
- in the study are but outside the vicinity.

The site code refers to the eight candidate sites - LF-2N, PI-13N, PI-1N, LF-4N, LF-3C, LF-9C, LF-1E and PI-27E. The siting-option code refers to the eight siting options - LF-1E, LF-9C, LF-3C, LF-2N/LF-13N, LF-2N/PI-1N, LF-4N/PI-1N, LF-4N/PI-13N and LF-1E/PI-27E.

Where study areas for two sites overlapped - LF-1E/PI-27E and LF-4N/PI-1N - properties in the overlap area were listed twice under each site code. A preliminary check was performed to eliminate duplicate properties and thus prevent double counting in later analysis for partially integrated siting options.

For farm properties larger than 5 ha where the owner/tenant refused an interview, or where property owners could not be located or contacted, information was obtained from the following sources:

- owner and property size from assessment role data
- field crops and land use from visual inspection in the field

- area of field crops measured after crops were mapped on 1:10,000 photomosaic-base maps (measurements made by technicians using electronic planimeter)
- farm building complexes identified by visual inspection and photographed from the road side
- livestock populations determined in interviews with local farmers and agricultural representatives (see Section 4.4).

Available crop and livestock information was coded. If available, tenure status of the farm operator was also coded, otherwise the property was coded as "unknown operator".

Finally, a number of larger properties (>5 ha) were classified as "non-farm" or "idle". These properties were either identified as such in interviews, or were classified based on field inspection. Where interview information was not available, non-farm property size data was obtained from the assessment roll data and the same sources as described for properties greater than 5 ha in size.

The following definitions were used for coding information.

SUBJECT Question No. (as per questionnaire)	TERM	DEFINITION
Section A 1	Description of farm operator	- NOTE - respondents read list as per Q.1 and were asked to categorize themselves
	Other	- includes mostly retired respondents who maintain a minimal level of activity. - also includes a school (Academy at LF-3C)
Section A 2	Tillable acres	- explained by interviewer as the number of acres that could be tilled or cultivated; they may not be currently tilled

Section E 20	Permanent Pasture	- area described as not capable of being tilled or cultivated but pastured

OTHER DEFINITIONS

PROPERTY STATUS CODES

The information provided by these two questions (Section E, Question 12 and 14), i.e. whether a property is owned or rented and whether the headquarters (the home and the main farm buildings) are located on the property, were used to develop a property status categorization. Each property in the study area is categorized in terms of its relationship to the person farming it. The following categories and their definitions were established:

RESIDENT - OWNER

Farm property that is owned and farmed by the resident.

RESIDENT - TENANT

Farm property that is rented and farmed by the resident who is also the tenant. (Property is owned by absentee landowner.)

TENANT

Farm property that is rented and farmed by an area farmer who does not own or reside on the property (the property may or may not have a resident, however, the resident is not engaged in farming the property).

RESIDENT OWNER TENANT

Farm property that is owned by and farmed in part by the resident. Typically, in this category, the resident utilizes the farm buildings and operates a livestock enterprise, e.g. broilers, and rents out the land to another farmer in the area.

OWNER - TENANT

Farm property that is owned by and farmed in part by the owner who does not reside on the property. Typically in this category, the owner utilizes the farm buildings and rents out the land to another area farmer.

OWNER

Farm property that is farmed by the owner who does not reside on the property (this property may or may not have a resident, however, the resident is not engaged in farming).

IDLE

Land not currently in agricultural use; it has the opportunity to be farmed but because of circumstances, e.g. bankruptcy, it is not being farmed.

NON-FARM

Land which contains industrial or commercial activities.

UNKNOWN OPERATOR

Property on which respondents either refused or could not be contacted. Supplementary sources indicate a measure of agricultural activity, i.e. visual inspection and aerial photo, hence we are able to identify specific crops and acreages.

ESTIMATION ERROR

Difference between the respondent's estimate of total acreage and the sum of tillable, permanent pasture, swamp and forest as well as buildings, fence lines, yards, etc.

2.2.9 Checks and Editing

Once the questionnaire data were entered into the computer, several checks and tests were completed to ensure that the data were correct.

First, the site maps were checked against the computerized data base information. All properties greater than 5 ha as well as farm properties less than 5 ha were checked. A cross-check of the I.E.R. data base was also undertaken to ensure coverage of all properties.

A check was also made to ensure that the properties were included in the correct siting options, especially in the case of overlapping study areas for LF-4N/PI-1N and LF-1E/PI-27E.

Thirdly, several logistical checks were undertaken for possible keypunching errors:

1. the number of crops planted could not be larger than the tillable acres;

2. the total number of hectares on the farm properties in the siting areas had to be less than or equal to the hectares of the entire farming operation;
3. tillable hectares plus hectares in swamp, forest and pasture had to be less than the total property size; and,
4. livestock found on properties in the siting area had to be less than or equal to livestock on the total farm operation.

Detailed area data for each crop type was reviewed during a mapping exercise for crops on each site. The type and area of crops obtained during the interviews were compiled on 1:10,000 photomosaics for each site. Where discrepancies between reported areas and the total were noted, the fields were measured with an electric planimeter and the areas recorded in the data base. During the on-site survey, the surveyors recorded the crop type where they took a soil sample. This information was compared to the crop maps and if there was a difference, the crop type recorded by the soil surveyors was used.

Composite crop and livestock maps were prepared for each candidate site at a scale of 1:10,000. The crops were mapped on a field-by-field basis and coloured according to the following categories:

small grains: includes winter wheat, oats, barley, mixed grains, rye, buckwheat and various small grains.
fruits, vegetables and berries: sweet corn, pumpkins, vegetables, fruit, strawberries, orchard and grapes.
row crops: corn, fodder corn, grain corn, soybeans.
forage crops: pasture, hay.
nurseries, sod: nursery, sod, Christmas trees.
other: recreation, idle, woodlot wet, non-farm.

Barns were shown by a dot, and codes representing the livestock and use (e.g. cash crop) were assigned to each.

These maps were reviewed with public groups at 'Walk and Talk' feedback meetings organized by the OWMC. The groups were asked to review the accuracy of the data and comment on completeness. Some missing crop and livestock information was added and additional interviews were undertaken at LF-3C and LF-1E.

The final maps are shown in the Site Selection Process. Phase 4A: Selection of a Preferred Site(s) - Agriculture. Technical Data Map Portfolio (Maps 9 to 16). Individual crops are not shown due to mapping restrictions. These are on file on working maps at Ecologistics Limited.

After the data base was fully checked and errors corrected, a program to summarize and tabulate data was developed. A hand tabulation of the information for the "on-site" properties was done to ensure accuracy. The tables were annotated and cross tabulated to check the addition. The tables describing overall farming operations were compared with those describing activities on study area properties to ensure consistency. Finally, project staff analyzed the tables to compare tabulated data to their knowledge of each area based on their field experiences.

2.2.10 Results

The data from the responses are shown in Table B-2. Outlined in Section A, B and C are data for all farm operations which are wholly or in part within the study areas. Section D, E and F report data for farmed properties on-site and in the vicinity. Responses to gross farm revenue and farm employment questions were very inconsistent and, therefore, these data were not compiled.

TABLE B-2

A. DATA RESULTS FOR THE FARM INTERVIEWS WITHIN THE SITE AND AGRICULTURAL VICINITY STUDY AREAS (SUMMER OF 1984)

	LF-2N	PI-13N	PI-1N	LF-4N	LF-3C	LF-9C	PI-27E	LF-1E
Total Respondents	32	54	52	40	59	50	36	82
Total Farmers	14 43.8%	36 66.7%	35 67.3%	30 75.0%	59 100.0%	44 88.0%	18 50.0%	47 57.3%
Full-Time Farmers Off-Farm Employment								
None	10 31.3%	16 29.6%	21 40.4%	17 42.5%	32 54.2%	27 54.0%	6 16.7%	13 15.9%
Some	0 .0%	2 3.7%	2 3.8%	3 7.5%	2 3.4%	0 .0%	1 2.8%	2 2.4%
Full-time	2 6.3%	5 9.3%	3 5.8%	4 10.0%	4 6.8%	7 14.0%	2 5.6%	5 6.1%
Part-Time Farmers Off-Farm Employment								
None	1 3.1%	2 3.7%	1 1.9%	0 .0%	1 1.7%	0 .0%	0 .0%	0 .0%
Some	0 .0%	1 1.9%	0 .0%	1 2.5%	1 1.7%	0 .0%	1 2.8%	1 1.2%
Full-time	0 .0%	6 11.1%	3 5.8%	4 10.0%	14 23.7%	5 10.0%	7 19.4%	15 18.3%
Hobby Farmers	0 .0%	1 1.9%	2 3.8%	0 .0%	1 1.7%	2 4.0%	0 .0%	6 7.3%
Other Farmers	1 3.1%	3 5.6%	3 5.8%	1 2.5%	4 6.8%	3 6.0%	1 2.8%	5 6.1%
Unknown Operator	6 18.8%	9 16.7%	7 13.5%	5 12.5%	0 .0%	0 .0%	0 .0%	5 6.1%
Rural Non-Farm	12 37.5%	9 16.7%	10 19.2%	5 12.5%	0 .0%	6 12.0%	18 50.0%	30 36.6%

TABLE B-2 CONT'D

B. TENURE STATUS AND TILLABLE HECTARES

	LF-2N	PI-13N	PI-1N	LF-4N	LF-3C	LF-9C	PI-27E	LF-1E
Hectares Farmed*	4417	4818	5312	4884	3922	2983	2048	2848
Hectares Owned	1207 27.3%	1557 32.3%	1330 25.0%	982 20.1%	3324 84.8%	2386 80.0%	593 29.0%	1278 44.9%
Hectares Rented	3210 72.7%	3261 67.7%	3977 74.9%	3902 79.9%	597 15.2%	597 20.0%	1454 71.0%	1567 55.1%
Hectares Tillable	3735 84.6%	4470 92.8%	4986 93.9%	4330 88.7%	3257 83.1%	2534 85.0%	1633 79.7%	2283 80.2%

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* Includes only the area covered by the farm interviews.

TABLE B-2 - cont'd

C. LIVESTOCK KEPT BY FARMERS*

	LF-2N	PI-13N	PI-1N	LF-4N	LF-3C	LF-9C	PI-27E	LF-1E
Dairy Cows	233	338	375	328	1054	696	86	90
Dairy Cows (under 1 year)	165	130	100	88	430	329	32	52
Replacement Heifers	130	179	122	77	453	303	57	33
TOTAL DAIRY CATTLE	528	647	597	493	1937	1328	175	175
Beef Cows	60	106	320	243	80	68	55	122
Beef Calves	67	84	260	73	96	90	34	112
Replacement Heifers	0	12	435	19	4	40	4	9
Feeder Cattle	175	118	1521	243	78	1730	31	98
Bulls	2	8	54	9	10	5	2	4
TOTAL BEEF CATTLE	304	328	2590	587	268	1933	126	345
Sows	5	12	180	8	171	124	311	316
Boars	1	1	11	1	8	3	26	27
Replacement Gilts	0	4	33	0	22	0	40	40
Pigs (under 2 months)	0	60	212	2	609	160	150	176
Feeder Pigs	26	0	170	6	767	1405	2730	2742
TOTAL PIGS	32	77	606	17	1577	1692	3257	3301
Layer Hens	160	90	737	125	348	72320	183	912
Broilers	0	0	30100	80050	47249	117336	35020	30030
TOTAL CHICKENS	160	90	30837	80175	47597	189656	35203	30942
Horses	27	151	181	63	39	13	4	79
Other	0	294	291	114	843	309	933	1340
Livestock Animal Units**	868	1159	3855	2034	3157	5748	1455	1733

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* Livestock located outside the study areas, but owned by farmers operating land inside the study areas are included in this table.

** Livestock animal units are calcualted on the basis of TDN consumption using the following factors: 1.000 for cattle and horses 0.222 for pigs
0.011 for chickens 0.050 for other livestock

Source: National Research Council, 1975-1984.

TABLE B-2 - cont'd

D(1). LIVESTOCK KEPT ON PROPERTIES IN THE LF-2N STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	0	0	0
Dairy Cows (under 1 year)	0	0	0
Replacement Heifers	0	0	0
TOTAL DAIRY CATTLE	0	0	0
Beef Cows	35	12	23
Beef Calves	42	12	30
Replacement Heifers	0	0	0
Feeder Cattle	125	0	125
Bulls	2	1	1
TOTAL BEEF CATTLE	204	25	179
Sows	5	0	5
Boars	1	0	1
Replacement Gilts	0	0	0
Pigs (under 2 months)	0	0	0
Feeder Pigs	26	0	26
TOTAL PIGS	32	0	32
Layer Hens	60	25	35
Broilers	0	0	0
TOTAL CHICKENS	60	25	35
Horses	27	5	22
Other	0	0	0
LIVESTOCK ANIMAL UNITS**	239	30	208

---

* Livestock located outside the study areas owned by farmers operating land inside the study areas are not included in this table.

** Livestock animal units are calculated on the basis of TDN consumption using the following factors:

1.000 for cattle and horses	0.222 for pigs
0.011 for chickens	0.050 for other livestock.

TABLE B-2 - cont'd

D(2). LIVESTOCK KEPT ON PROPERTIES IN THE PI-13N STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	238	65	173
Dairy Cows (under 1 year)	102	30	72
Replacement Heifers	136	30	106
TOTAL DAIRY CATTLE	476	125	351
Beef Cows	106	1	105
Beef Calves	84	1	83
Replacement Heifers	12	0	12
Feeder Cattle	118	0	118
Bulls	7	0	7
TOTAL BEEF CATTLE	327	2	325
Sows	12	0	12
Boars	1	0	1
Replacement Gilts	4	0	4
Pigs (under 2 months)	60	0	60
Feeder Pigs	0	0	0
TOTAL PIGS	77	0	77
Layer Hens	90	50	40
Broilers	0	0	0
TOTAL CHICKENS	90	50	40
Horses	82	9	73
Other	290	163	122
LIVESTOCK ANIMAL UNITS**	917	145	772

TABLE B-2 - cont'd

D(3). LIVESTOCK KEPT ON PROPERTIES IN THE PI-1N STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	239	0	239
Dairy Cows (under 1 year)	44	0	44
Replacement Heifers	68	0	68
TOTAL DAIRY CATTLE	351	0	351
Beef Cows	115	43	72
Beef Calves	178	38	140
Replacement Heifers	40	19	21
Feeder Cattle	30	8	22
Bulls	16	4	12
TOTAL BEEF CATTLE	379	112	267
Sows	0	0	0
Boars	0	0	0
Replacement Gilts	0	0	0
Pigs (under 2 months)	0	0	0
Feeder Pigs	0	0	0
TOTAL PIGS	0	0	0
Layer Hens	187	75	112
Broilers	30050	50	30000
TOTAL CHICKENS	30237	125	30112
Horses	65	0	65
Other	172	110	62
LIVESTOCK ANIMAL UNITS**	1136	119	1017

TABLE B-2 - cont'd

D(4). LIVESTOCK KEPT ON PROPERTIES IN THE LF-4N STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	217	0	217
Dairy Cows (under 1 year)	85	0	85
Replacement Heifers	52	0	52
TOTAL DAIRY CATTLE	354	0	354
Beef Cows	73	0	73
Beef Calves	48	0	48
Replacement Heifers	19	0	19
Feeder Cattle	243	0	243
Bulls	6	0	6
TOTAL BEEF CATTLE	389	0	389
Sows	8	0	8
Boars	1	0	1
Replacement Gilts	0	0	0
Pigs (under 2 months)	2	0	2
Feeder Pigs	6	0	6
TOTAL PIGS	17	0	17
Layer Hens	125	0	125
Broilers	50	0	50
TOTAL CHICKENS	175	0	175
Horses	58	32	26
Other	0	0	0
LIVESTOCK ANIMAL UNITS**	807	32	775

TABLE B-2 - cont´d

D(5). LIVESTOCK KEPT ON PROPERTIES IN THE LF-3C STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	717	3	714
Dairy Cows (under 1 year)	273	0	273
Replacement Heifers	341	67	274
TOTAL DAIRY CATTLE	1331	70	1261
Beef Cows	80	3	77
Beef Calves	96	3	93
Replacement Heifers	4	0	4
Feeder Cattle	58	1	57
Bulls	9	0	9
TOTAL BEEF CATTLE	247	7	240
Sows	171	0	171
Boars	8	0	8
Replacement Gilts	22	0	22
Pigs (under 2 months)	609	0	609
Feeder Pigs	757	0	757
TOTAL PIGS	1567	0	1567
Layer Hens	298	0	298
Broilers	47249	0	47249
TOTAL CHICKENS	47547	0	47547
Horses	38	0	38
Other	842	43	799
LIVESTOCK ANIMAL UNITS**	2526	79	2447

TABLE B-2 - cont´d

D(6). LIVESTOCK KEPT ON PROPERTIES IN THE LF-9C STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	478	35	443
Dairy Cows (under 1 year)	197	4	193
Replacement Heifers	166	5	161
TOTAL DAIRY CATTLE	841	44	797
Beef Cows	52	0	52
Beef Calves	74	0	74
Replacement Heifers	24	12	12
Feeder Cattle	1730	0	1730
Bulls	5	0	5
TOTAL BEEF CATTLE	1885	12	1873
Sows	84	0	84
Boars	3	0	3
Replacement Gilts	0	0	0
Pigs (under 2 months)	160	0	160
Feeder Pigs	1360	0	1360
TOTAL PIGS	1607	0	1607
Layer Hens	22300	20	22280
Broilers	117336	36	117300
TOTAL CHICKENS	139636	56	139580
Horses	13	1	12
Other	228	30	198
LIVESTOCK ANIMAL UNITS**	4640	59	4581

TABLE B-2 - cont'd

D(7). LIVESTOCK KEPT ON PROPERTIES IN THE PI-27E STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	41	0	41
Dairy Cows (under 1 year)	20	0	20
Replacement Heifers	24	0	24
TOTAL DAIRY CATTLE	85	0	85
Beef Cows	55	29	26
Beef Calves	34	5	29
Replacement Heifers	4	0	4
Feeder Cattle	31	0	31
Bulls	2	0	2
TOTAL BEEF CATTLE	126	34	92
Sows	37	0	37
Boars	1	0	1
Replacement Gilts	0	0	0
Pigs (under 2 months)	150	0	150
Feeder Pigs	75	0	75
TOTAL PIGS	263	0	263
Layer Hens	200	0	200
Broilers	35020	0	35020
TOTAL CHICKENS	35220	0	35220
Horses	1	0	1
Other	889	150	739
LIVESTOCK ANIMAL UNITS**	702	41	660

TABLE B-2 - cont'd

D(8). LIVESTOCK KEPT ON PROPERTIES IN THE LF-1E STUDY AREAS*

	TOTAL	ON-SITE	VICINITY
Dairy Cows	0	0	0
Dairy Cows (under 1 year)	0	0	0
Replacement Heifers	0	0	0
TOTAL DAIRY CATTLE	0	0	0
Beef Cows	100	6	94
Beef Calves	53	7	46
Replacement Heifers	4	3	1
Feeder Cattle	83	25	58
Bulls	2	0	2
TOTAL BEEF CATTLE	242	41	201
Sows	32	0	32
Boars	2	0	2
Replacement Gilts	0	0	0
Pigs (under 2 months)	176	0	176
Feeder Pigs	87	2	85
TOTAL PIGS	297	2	295
Layer Hens	890	300	590
Broilers	30020	0	30020
TOTAL CHICKENS	30910	300	30610
Horses	76	49	27
Other	1304	185	1119
LIVESTOCK ANIMAL UNITS**	789	103	686

TABLE B-2 - cont´d

E(1). DISPOSITION OF LAND IN THE LF-2N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1432	150	1282
Farm Hectares	1001 69.9%	150 100.0%	851 66.4%
Tillable	849 59.3%	130 86.5%	719 56.1%
Permanent Pasture	45 3.2%	12 8.4%	33 2.6%
Swamp	2 .2%	0 .0%	2 .2%
Forest	22 1.6%	0 .0%	22 1.7%
Estimation Error	82 5.7%	8 5.1%	74 5.8%
Idle Hectares	75 5.2%	0 .0%	75 5.8%
Non-Farm Hectares	204 14.2%	0 .0%	204 15.9%
Unknown Operator	153 10.7%	0 .0%	153 11.9%
Respondents	7	0	7

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* Includes only the area covered by the farm interviews.

TABLE B-2 - cont'd

E(2). DISPOSITION OF LAND IN THE PI-13N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	2206	163	2043
Farm Hectares	1952 88.5%	163 100.0%	1789 87.5%
Tillable	1656 75.1%	138 84.8%	1518 74.3%
Permanent Pasture	86 3.9%	17 10.7%	69 3.4%
Swamp	5.4 .2%	0.4 .2%	5 .2%
Forest	85 3.9%	4 2.5%	81 4.0%
Estimation Error	119 5.4%	3 1.7%	116 5.7%
Idle Hectares	94 4.2%	0 .0%	94 4.6%
Non-Farm Hectares	53 2.4%	0 .0%	53 2.6%
Unknown Operator	109 4.9%	0 .0%	109 5.3%
Respondents	11	0	11

TABLE B-2 - cont'd

E(3). DISPOSITION OF LAND IN THE PI-1N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	2117	365	1752
Farm Hectares	1987 93.8%	324 88.7%	1663 94.9%
Tillable	1635 77.2%	261 71.4%	1374 78.4%
Permanent Pasture	66 3.1%	0 .0%	66 3.8%
Swamp	8.4 .4%	0.4 .1%	8 .4%
Forest	76 3.6%	16 4.3%	60 3.4%
Estimation Error	202 9.6%	47 12.9%	155 8.9%
Idle Hectares	19 .9%	15 4.0%	4 .2%
Non-Farm Hectares	11 .5%	0 .0%	11 .6%
Unknown Operator	102 4.8%	27 7.3%	75 4.3%
Respondents	6	2	4

TABLE B-2 - cont'd

E(4). DISPOSITION OF LAND IN THE LF-4N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	2150	161	1989
Farm Hectares	1992 92.6%	103 63.8%	1889 95.0%
Tillable	1658 77.1%	89 55.0%	1569 78.9%
Permanent Pasture	99 4.6%	1 .8%	98 4.9%
Swamp	15 .7%	0 .0%	15 .8%
Forest	69 3.2%	5 3.0%	64 3.2%
Estimation Error	151 7.0%	8 5.0%	143 7.2%
Idle Hectares	92 4.3%	58 36.2%	34 1.7%
Non-Farm Hectares	0 .0%	0 .0%	0 .0%
Unknown Operator	67 3.1%	0 .0%	67 3.4%
Respondents	4	0	4

TABLE B-2 - cont'd

E(5). DISPOSITION OF LAND IN THE LF-3C STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	2589	251	2338
Farm Hectares	2570 99.3%	250 100.0%	2320 99.2%
Tillable	2111 81.5%	196 78.4%	1915 81.9%
Permanent Pasture	67 2.6%	8 3.4%	59 2.5%
Swamp	46 1.8%	6 2.3%	40 1.7%
Forest	291 11.2%	30 12.0%	261 11.2%
Estimation Error	55 2.1%	10 4.0%	45 1.9%
Idle Hectares	0 .0%	0 .0%	0 .0%
Non-Farm Hectares	19 .7%	0 .0%	19 .8%
Unknown Operator	0 .0%	0 .0%	0 .0%
Respondents	0	0	0

TABLE B-2 - cont'd

E(6). DISPOSITION OF LAND IN THE LF-9C STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	2111	121	1990
Farm Hectares	1999 94.7%	81 66.7%	1918 96.4%
Tillable	1615 76.5%	69 57.0%	1546 77.7%
Permanent Pasture	63 3.0%	3 2.7%	60 3.0%
Swamp	69 3.3%	6 5.0%	63 3.2%
Forest	177 8.4%	2 2.0%	175 8.8%
Estimation Error	75 3.5%	0 .0%	75 3.7%
Idle Hectares	92 4.3%	41 33.3%	51 2.6%
Non-Farm Hectares	21 1.0%	0 .0%	21 1.0%
Unknown Operator	0 .0%	0 .0%	0 .0%
Respondents	0	0	0

TABLE B-2 - cont'd

E(7). DISPOSITION OF LAND IN THE PI-27E STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1620	154	1466
Farm Hectares	1048 64.7%	153 100.0%	895 61.0%
Tillable	811 50.1%	125 81.3%	686 46.8%
Permanent Pasture	10 .6%	3 2.1%	7 .5%
Swamp	9 .5%	0 .0%	9 .6%
Forest	165 10.2%	7 4.7%	158 10.8%
Estimation Error	53 3.3%	18 11.9%	35 2.4%
Idle Hectares	145 8.9%	0 .0%	145 9.9%
Non-Farm Hectares	427 26.4%	0 .0%	427 29.1%
Unknown Operator	0 .0%	0 .0%	0 .0%
Respondents	0	0	0

TABLE B-2 - cont'd

E(8). DISPOSITION OF LAND IN THE LF-1E STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1944	191	1753
Farm Hectares	1450 74.6%	148 77.4%	1302 74.3%
Tillable	1076 55.3%	113 59.0%	963 55.0%
Permanent Pasture	16 .8%	0 .0%	16 .9%
Swamp	34 1.7%	0.4 .2%	34 1.9%
Forest	281 14.4%	32 16.5%	249 14.2%
Estimation Error	44 2.2%	3 1.7%	41 2.3%
Idle Hectares	108 5.6%	33 17.3%	75 4.3%
Non-Farm Hectares	258 13.3%	10 5.3%	248 14.1%
Unknown Operator	128 6.6%	0 .0%	128 7.3%
Respondents	5	0	5

TABLE B-2 - cont'd

F(1). CROPPING PATTERNS IN THE LF-2N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	855	126	729
Corn	289	32	257
Barley	32	32	0
Soybeans	183	32	151
Winter Wheat	131	7	124
Hay	101	13	88
Oats	69	0	69
Market Garden	0	0	0
Clover/Trefoil Seed	0	0	0
Fruit Trees	0	0	0
Mixed Grain	50	10	40
Other	0	0	0

---

* Includes only the area covered by the farm interviews.

TABLE B-2 - cont'd

F(2). CROPPING PATTERNS IN THE PI-13N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1567	138	1429
Corn	356	0	356
Barley	59	0	59
Soybeans	100	0	100
Winter Wheat	153	0	153
Hay	647	94	553
Oats	57	0	57
Market Garden	12	0	12
Clover/Trefoil Seed	0	0	0
Fruit Trees	10	0	10
Mixed Grain	84	44	40
Other	96	0	96

TABLE B-2 - cont´d

F(3). CROPPING PATTERNS IN THE PI-1N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1477	254	1223
Corn	489	95	394
Barley	20	0	20
Soybeans	152	24	128
Winter Wheat	149	58	91
Hay	496	65	431
Oats	62	0	62
Market Garden	0	0	0
Clover/Trefoil Seed	0	0	0
Fruit Trees	0	0	0
Mixed Grain	82	12	70
Other	27	0	27

TABLE B-2 - cont´d

F(4). CROPPING PATTERNS IN THE LF-4N STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1539	91	1448
Corn	375	24	351
Barley	48	0	48
Soybeans	161	12	149
Winter Wheat	225	15	210
Hay	374	21	353
Oats	166	0	166
Market Garden	3	0	3
Clover/Trefoil Seed	2	0	2
Fruit Trees	39	0	39
Mixed Grain	124	0	124
Other	22	18	4

TABLE B-2 - cont´d

F(5). CROPPING PATTERNS IN THE LF-3C STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	2007	174	1883
Corn	469	37	432
Barley	66	0	66
Soybeans	60	9	51
Winter Wheat	199	56	143
Hay	1097	56	1041
Oats	88	15	73
Market Garden	0.4	0	0.4
Clover/Trefoil Seed	0	0	0
Fruit Trees	6	0	6
Mixed Grain	9	0	9
Other	11	0	11

TABLE B-2 - cont'd

F(6). CROPPING PATTERNS IN LF-9C STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	1555	64	1491
Corn	473	3	470
Barley	128	7	121
Soybeans	129	0	129
Winter Wheat	164	0	164
Hay	610	54	556
Oats	39	0	39
Market Garden	0.4	0	0.4
Clover/Trefoil Seed	0	0	0
Fruit Trees	0	0	0
Mixed Grain	10	0	10
Other	2	0	2

TABLE B-2 - cont'd

F(7). CROPPING PATTERNS IN THE PI-27E STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	713	93	620
Corn	213	45	168
Barley	71	0	71
Soybeans	36	0	36
Winter Wheat	153	14	139
Hay	217	27	190
Oats	12	0	12
Market Garden	1	0	1
Clover/Trefoil Seed	0	0	0
Fruit Trees	0	0	0
Mixed Grain	0	0	0
Other	10	8	2

TABLE B-2 - cont´d

F(8). CROPPING PATTERNS IN THE LF-1E STUDY AREA*

	TOTAL	ON-SITE	VICINITY
Total Hectares	961	86	875
Corn	288	14	274
Barley	17	0	17
Soybeans	0	0	0
Winter Wheat	166	12	154
Hay	412	61	351
Oats	15	0	15
Market Garden	2	0	2
Clover/Trefoil Seed	40	0	40
Fruit Trees	4	0	4
Mixed Grain	0	0	0
Other	20	0	20

An attempt was made to collect sufficient information during the site visit to enable an appriaser to classify buildings. However, in his opinion, there was insufficient information available from the questionnaires to make an accurate classification.

2.3 ON-SITE SOIL SURVEY

2.3.1 Introduction

Existing maps of agricultural soils in the siting option study areas are relatively small scale and not suitable for site-level analysis. The available maps include:

- Soil Survey Map of the County of Welland, Soil Survey Report No. 5, Dominion Dept. of Agriculture, 1935, scale = 1:126,720 (Sites LF-1E, PI-27E);
- Soils of the Townships of West Lincoln, Preliminary Map P-24, Ontario Institute of Pedology, 1982, scale = 1:25,000 (Sites LF-3C, LF-9C);
- Soils of Halton County, Soil Survey Report No. 43, Canada Department of Agriculture, 1971, scale = 1:63,360 (Sites PI-13N, PI-1N, LF-4N);
- Soil Survey of Peel County, Soil Survey Report No. 18, Canada Department of Agriculture, 1953, scale = 1:63,360 (Site LF-2N).

Consequently, on-site soil surveys were conducted to obtain more detailed soils information. The methodology for the soil survey work is described and the results are described below.

2.3.2 Methodology

Prior to field work, permission was obtained from residents of on-site properties to enter their property for soil mapping (see p. B-24). Also, the proposed survey procedures were discussed with representatives of the Ontario Institute of Pedology.

Soils were sampled across the candidate sites (within the Phase 3B acquisition boundaries for LF-3C, LF-1E and PI-1N) using a working scale photo-base map at a scale of 1:10,000. A grid survey was carried out with sampling at a 200 meter intervals. This insured a minimum of one sample point for each 10 acres (4.05 ha). For all candidate sites the acquisition area was photo-interpreted and the survey grid was set out to assure sampling of all soil types and conditions.

At each sampling location, soil texture and morphological features were observed to a depth of one meter using a Dutch auger. Sampling locations and results were recorded on survey field sheets. All the information was derived from hand texturing and visual observations. No soil samples were taken for laboratory analysis. Topographical features, surface stoniness, extent of soil erosion and land use (cropping) patterns were also noted.

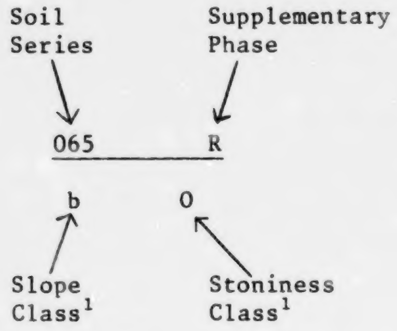
An analysis and mapping of soil series was subsequently undertaken. Soil series were identified and mapped on 1:10,000 air photo stereo-pairs (1984). Mapping conventions are shown in Figure B-7 and B-8.

2.3.3 Comparison of Results with Published Soils Data

An assessment of the reliability of previous soil surveys was carried out. Soil series assessed at soil inspection points were compared to the published soil series mapping.

FIGURE B-7

SOIL MAP CONVENTION (SOUTH REGION):



[1] - slope and stoniness classes as defined by the CanSIS field manual (C.S.S.C., 1978).

SOIL SERIES

064	(moderately well drained)	dominantly heavy clay or at least 15 cm of heavy clay texture (lacustrine)
065	(imperfectly drained)	
066	(poorly drained)	
055	(imperfectly drained)	silty clay loam, silty clay, or clay (lacustrine)
056	(poorly drained)	
745	(imperfectly drained)	silt loam, loam, or very fine sandy loam 40-100 cm thick over 06 parent materials (lacustrine)
900	(variable drainage)	undifferentiated stream courses and active floodplains (alluvial)

SUPPLEMENTARY PHASES

R (red phase) - red horizon(s) > 10 cm in thickness and 7.5 YRm or redder in colour.

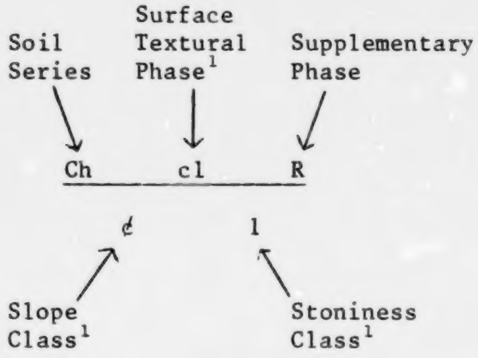
L (loamy phase) - surface 15-40 cm consists of any textures with less than 40% clay (except loamy sands or sands), underlain by material containing at least 15 cm of heavy clay (06 parent material).

G (gley phase) - for poorly drained clays (056, 066) that may or may not be very poorly drained with high organic matter contents and cannot be separated as peaty phases. Low chroma, gley colours predominate in the matrix with or without large prominent mottles.

FIGURE B-8

SOIL MAP CONVENTION (NORTH REGION):

e.g.


Soil Series
Surface Textural Phase[1]
Supplementary Phase
Ch
cl
R
¢
1
Slope Class[1]
Stoniness Class[1]

SOIL SERIES

On - Oneida
Ch - Chinguacousy
Je - Jeddo
Pe - Peel
Ma - Malton

[1] - textural, slope, and stoniness classes as defined by the CanSIS field manual (C.S.S.C., 1978).

SUPPLEMENTARY PHASES

R (red phase)	- red horizon(s) > 10 cm in thickness and 7.5 YRm or redder in colour.
Q (queer phase)	- normal series situated on old elevated terraces which are no longer subject to flooding but having textural layers (i.e. sl, sil) deposited by ancient floods.

[2] - these phases were not distinguished in the Peel and Halton Region reconnaissance soil inventory and were extrapolated from the semi-detailed Niagara region survey.

The usefulness of a detailed soil survey was clearly demonstrated by survey findings. Comparisons with published reconnaissance survey inventory mapping indicated that:

1. the distribution of drainage classes shifts towards more poorly drained members (a trend noted elsewhere, Acton, et al., 1979);
2. the proportion of intrusions of one series into mapped areas of another often exceeds the assumed 15% (Acton, et al., 1979);
3. complex soils exhibit proportions of soils in member series differing markedly from reported values;
4. the increase in scale to 1:10,000 has made significant changes in the areal extent and distribution of both parent materials and internal soil drainage classes.

A site-by-site comparison of reconnaissance soil inventories and the Phase 4A survey is outlined below:

LF-2N
- there was a major shift in distribution towards more poorly-drained members; no moderately well drained Halton till (Oneida series) was found, while imperfectly drained (Chingaucousy series) and poorly drained (Jeddo series) made up 47% and 31% of the total site area.
- Peel and Malton series occurred less frequently than indicated by reconnaissance mapping
- the delineation of depressional areas at the reconnaissance level was largely inaccurate.

PI-13N
- only Chingaucousy (72%) and Jeddo (38%) series were found in Oneida map units
- Chinguacousy map units exhibited 52% inclusion by Jeddo series
- major depressions were mapped accurately at the small scale.

PI-1N	- Jeddo and Chinguacousy soils were more intimately associated than was indicated - 77% of samples in Oneida map units belonged to the Chinguacousy series.
LF-4N	- Jeddo and Chinguacousy series are quite evenly distributed over the site in contrast to the larger continuous units at the reconnaissance level.
LF-9C	- complex units show a more even distribution of members than is reported - simple series map units were not reliably mapped.
LF-3C	- simple map units were not reliably mapped - only 065 and 066 series were found in the 0555 + 0565 complex - re-estimated proportions of component series varied considerably from reported values.
LF-1E	- soils were remapped using revised soil descriptions - revised series were correlated with mapped Welland and Niagara series - the poorly drained Welland series exhibited a 41% inclusion by the imperfectly drained 065 series.
PI-27E	- the well drained Niagara series had a 40% inclusion by sample from poorly drained 056 and 066 series. - in the poorly drained Welland unit, 48% of site inspection revealed imperfectly drained 055 and 065 series.

Soil units were mapped on 1:5,000 photomosaics and the soil series or dominant parent material, surface texture phase, slope class, CLI agricultural capability and sub-class were shown. These maps were reviewed at O.W.M.C. `Walk and Talk´ feedback meetings and concerns expressed by the public were checked. The consultants met with local residents at LF-1E and PI-27E to review the ratings of the field. The final maps were reviewed by the Ontario Institute of Pedology. Summary descriptions of the soils on each site appear in Appendix D. Table C-1 in Appendix C lists the map units and the area of each for the individual sites.

The maps (Maps 1 to 8) are located in the Site Selection Process. Phase 4A: Selection of a Preferred Site(s) - Agriculture. Technical Data Map Portfolio which accompanies this report.

3.0 DATA COLLECTION FOR ACCESS ROADS

3.1 INTRODUCTION

This section describes the data collection procedures undertaken for the Phase 4A analysis of access roads. The data collection for access roads involved the following:

1. interviews with farm operators of properties which abut the proposed access roads:
   - within the agricultural vicinity study area in conjunction with the interviews with farm operators, and
   - from the boundary of the 'Walk and Talk' study area to the 400 series highways.
2. A field survey of crops within 800 m either side of the proposed access roads.
3. An assessment of agricultural activities downstream of proposed access roads.

These procedures are described in the remainder of this section. Details of the methodology for the analysis of access road options are described in Chapter 3.

3.2 ACCESS ROAD INTERVIEWS

3.2.1 Introduction

Access road interviews were conducted to obtain information for the following indicators: farm machinery movements, customer stops, service vehicle stops, the amount of land with access from the road, livestock and poultry housed, livestock pastured, cattle crossings, and the location of farm headquarters.

The interviews were undertaken in two phases. Phase 1 in July and August, 1984, was undertaken as part of the interviews with farm operators in the site and agricultural vicinity. Phase 2 was undertaken as a separate study from November to December, 1984, for sections outside the agricultural study areas to the 400 series highways.

Details of the procedures for each of the phases are described below. The data for both phases were compiled by one procedure. This is outlined in Section 3.5.

3.2.2 Access Road Interviews Within the Site Vicinity

The access road study area was comprised of all farmed parcels of land which abut the proposed access route options. The boundaries of the parcels were identified on the Ministry of Revenue Assessment Roll Maps (1"=400′ approximately).

3.2.3 Questionnaire Design

The questionnaire was designed to supplement the agricultural site and vicinity questionnaire and obtain specific information on farm machinery movements, service vehicle stops and cattle crossings for farm parcels which abut the proposed access routes. Also, agricultural activities adjacent to the roads were highlighted. A question on water supply was included in the form for Gartner Lee Associates (Question 8).

A copy of the interview form is shown in Figure B-9.

3.2.4 Interview Procedure

The access road interviews commenced when the site and vicinity interviews were in progress. Consequently, the interviewers personally called back to any farmers of parcels adjacent to the access roads who had completed the agricultural questionnaires, and requested that they fill out the additional access road survey form. At subsequent interviews, farmers who indicated that they use the proposed access roads for farm-related activities were asked to also complete the access road survey form.

In Question 4, farmers were requested to indicate on a map, the crops and livestock pastured in fields adjacent to the access roads. This information was recorded on the 1:10,000 photomosaic working maps which were being used for the interviews.

3.2.5 Response Rates

The response rates for the interviews within the vicinity study area are summarized in Table B-3. Of a total of 71 farm operators, 63 interviews (89%) were completed. Eight of these were not used as the interview forms were not sufficiently filled out.

There are a number of farmed parcels without farm headquarters. Most, however, are farmed by respondents. Of the remainder, most tenants were identified and interviewed. As shown on Table B-3, 126 of a total of 165 of these properties were covered by the interviews.

FIGURE B-9 Interview Identification Number: _______

OWMC PHASE 4A

INTERVIEW FORM

FARM PROPERTIES ON LOCAL ACCESS ROUTES TO THE CANDIDATE SITES

THE PURPOSE OF THE INTERVIEW

The purpose for this interview is to collect information from farm operators along local access route to OWMC's candidate sites. This information will be used to develop evaluation criteria to compare the candidate sites. In combination with other information, it will help us to eliminate unsuitable sites and select a preferred site or sites for OWMC's waste treatment facilities. The interview also provides residents along the local access roads to the candidate sites with an opportunity to provide OWMC's consultants with characteristics of their properties that may be significant and relevant to the selection of a preferred site or sites.

Site: __________ Date: ____________________ Time: ____________

Interviewer(s): ____

Respondent's Name: ____

Address: ____________________ ________________________________

____

____

Lot: _______________ Concession: _______________

Township: ____________________ Telephone: ____________

Property is: On Site Assessment Roll Numbers _________

Adjacent Assessment Roll Numbers _________

NOTE: OWMC will not volunteer, disclose or attribute information of a personal, confidential or private nature; however the information might become subject to disclosure if OWMC is so ordered by the hearing officers, and may be used by OWMC for the purpose of compiling aggregated statistics and other data, the individual components of which would not be separately identified.

FIGURE B-9 - cont'd

Interview Identification Number: ________

SURVEY OF AGRICULTURAL OPERATIONS
ON LOCAL ACCESS ROADS

1. Areas Involved

   (a) How many acres do you farm in total? ________ acres

   (b) How many of these acres have their main access point from ________________?
   (access road) ________ acres

2. Land Tenure of Properties Adjacent to Access Road

   (a) How much frontage used? ________ acres

   (b) How large is this particular property? ________ acres

3. Farming Activities

   (a) How would you describe the farming activity taking place on this farm property? (please check one)

   Cash Crop ____

   Mixed crop and livestock ____

   Specialist livestock:

   - dairy ____
   - beef ____
   - hogs ____
   - poultry ____

   Other (please explain) ____

ANSWER ONLY IF LIVESTOCK IS KEPT ON THE FARM PROPERTY.

(b) Could you describe what type and numbers of livestock are located on this farm property. (list below)

Livestock Type	Numbers

FIGURE B-9 - cont'd

Livestock Type	Numbers
____	____
____	____
____	____
____	____
____	____
____	____

4. Description of Activity on Lands Immediately Adjacent to Access Road

(Repeat for each farm property.)

Using a map, indicate the location of each field adjacent to access road.

(INTERVIEWER will provide a map)

(a)	How many acres are there in each field?	(record below)
(b)	What crops are usually grown in each field?	(record below)
(c)	Are livestock ever pastured in each field?	(record below)
(d)	(If answer is yes to 4(c) What type of livestock and how many head would be pastured?)	(record below)

	4(a)	4(b)	4(c)	4(d)	
Field Nos.	Size (acres)	Crops Usually Grown	Pasture (Circle if Yes)	Livestock Type	Livestock Number
1	____	____	Y	____	____
2	____	____	Y	____	____
3	____	____	Y	____	____
4	____	____	Y	____	____
5	____	____	Y	____	____
6	____	____	Y	____	____

5. Machinery Movements

Do you have to move farm machinery across or along ____________ (access road) any time during the year? (Please check)

Yes ____

No ____

6. Traffic Patterns

I would like you to think of each time you travel on ____________ (access road) with a piece of farm machinery or equipment at below highway speeds. First of all, identify all the different machines and machinery combinations that you move on or across the access road (see samples next page[1]). Then for each month, estimate the average mileage per trip and the number of trips.

FIGURE B-9 - cont'd

Description of Machine or Machine Complement	Average Distance Travelled (total both ways)	Do you Cross the Road or Turn Left (yes or no)	(If yes) At an Intersection or Other Farm?	Number of Times Each Month											
				J	F	M	A	M	J	J	A	S	O	N	D

[1] Tractor alone
Tractor + plough
Tractor + baler
Combine
Truck + ________

FIGURE B-9 - cont'd

7. Truck Traffic

(a) Do you have large trucks turning in and out of your driveway on a regular basis?

No ______

Yes ______ then, indicate type and frequency per year

milk truck	____________
feed truck	____________
livestock truck	____________
other	____________

(b) Do you need to move livestock across the access road?

No ______

Yes ______ then, number of times per year ____________

8. Report for Each Invidivual Farm Property

(a) What is your water supply on this farm property? (describe below)

____

____

____

____

____

____

____

(b) For what purpose is water used? (check below)

Livestock	______
Irrigation	______
Domestic	______

FIGURE B-9 - cont'd

Interview Identification Number: ________

CONCLUSION OF THE INTERVIEW

Time Completed: ______________________

Respondent's request for additional information:

- information requested:

- action required:
  - send reports
    specify ________________________________
  - contact by phone
    preferred time ___________________________
  - other
    specify ________________________________

Additional data/information that may be relevant to the study team:

Interview attachments:

Map ☐

Other ☐ specify ____________________________

TABLE B-3

SURVEY COVERAGE OF FARMED PARCELS ALONG ACCESS ROADS WITHIN THE AGRICULTURAL VICINITY

	SUMMARY OF RESPONSE RATES			
Road	Total No. of Interviews	No. of Incomplete Interviews	Total No. of Farm Properties	Total No. of Properties Covered
Highway 20	18	0	24	24
Schram Rd.	2	0	3	3
Elcho Rd.	10	0	21	15
Krick Rd.	5	0	12	12
Biggar Rd.	2	1	5	2
Carl	2	0	10	3
Young	0	0	6	5
Schisler	0	0	6	1
Montrose	0	0	0	0
Crowland Ave.	1	0	8	5
Britannia	9	3	30	22
Fourth Line	5	0	9	9
Fifth Line	7	0	12	9
Bronte Rd.	7	3	17	14
Trafalgar	3	1	2	2
TOTALS	71	8	165	126

3.3 ACCESS ROAD INTERVIEWS OUTSIDE THE AGRICULTURAL VICINITY

3.3.1 Study Area

Interviews undertaken outside the vicinity boundary include all farmed properties which abut the proposed access roads from the 400 series highways to the site vicinity boundary.

3.3.2 Questionnaire Design

The questionnaire was combined with a socio-economic questionnaire prepared for use by the Institute of Environmental Research. The survey forms used for the site and vicinity interviews were re-designed so they could be filled out and returned by respondents without the assistance of an interviewer. A copy of the agricultural survey form is included in Figure B-10.

3.3.3 Interview Procedure

The interviews were undertaken during November 15 to 23, 1984. The interview procedure is summarized in the following steps:

1. The boundaries of parcels which abut access roads were transferred from the Ministry of Revenue Assessment Maps (1"=400′) to 1:10,000 scale photomosaic working maps.
2. Parcels identified by the assessment roll information as farms were highlighted on the maps.
3. A farm interviewer and an interviewer from I.E.R. determined from roadside inspections whether a residence was farm or non-farm.
4. At farm residences, both a farm and socio-economic questionnaire were dropped off. An accompanying letter asked respondents to fill out the questionnaire and advised that an interviewer would return in several days to pick it up.

Interview Identification No. ________ FIGURE B-10

OWMC PHASE 4A
SURVEY FORM

PROPERTIES ON POTENTIAL ACCESS ROUTES TO THE CANDIDATE SITES

THE PURPOSE OF THE SURVEY

The purpose for this survey is to collect information from residents along potential access routes to OWMC's candidate sites. This information will be used to develop evaluation criteria to compare the candidate sites. In combination with other information, it will help us to eliminate unsuitable sites and select a preferred site or sites for OWMC's waste treatment facilities. The survey also provides residents along the potential access roads to the candidate sites with an opportunity to provide OWMC's consultants with characteristics of their properties that may be significant and relevant to the selection of a preferred site or sites.

THE POTENTIAL ACCESS ROAD IS ________________________________

Your Name: ________________________________

Address: ________________________________

____

____

Lot: ____________ Concession: ____________

Township: ____________ Telephone: ____________

NOTE: OWMC will not volunteer, disclose or attribute information of a personal, confidential or private nature; however, the information might become subject to disclosure if OWMC is so ordered by the hearing officers. Also the information may be used by OWMC for the purpose of compiling aggregated statistics and other data, the individual components of which would not be separately identified.

FIGURE B-10 - cont'd

FARM PROPERTY SURVEY Interview Identification No. ________

- If you operate a farm on this property, please fill out all of the following questions.
- If you farm part of the property, and rent part to someone else, please fill out the questions for your operation only. We will contact the tenant for the remaining information.
- If you are a tenant please fill out all of the following questions.

---

1. Do you operate a farm on this property?
   Yes ________
   No ________

2. Are any of your land or buildings rented to someone else for farming purposes?
   Yes ________
   No ________

   If the land or buildings are rented, please identify the tenant.

   Name: ________________ Tele. No.: ________
   Address: ________________

3. If you farm other property(ies) along ________ would you identify the location?
   Lot ______ Conc ______
   Lot ______ Conc ______

4. How many tillable acres do you farm in total? acres ________

5. How many of these acres have their main access point from this access road? acres ________

6. Farming Activities
   (Please fill out Question 6 for each separate property which abuts the access road. If more than one property is farmed, the interviewer will provide additional questionnaires for each property when they call back.)

   How would you describe the farming activity which you carry out on this farm property? (please check one)

   Cash Crop ______
   Mixed Crop and Livestock ______
   Specialist Livestock - dairy ______
   beef ______
   hogs ______
   poultry ______

   Horses ______
   Fruits ______
   Vegetables ______
   Other (please explain)
   ____
   ____

7. On the chart below, please describe the type and number of livestock which you are currently housing in buildings on this property.

Livestock Type	Numbers of Livestock

none

FIGURE B-10 - cont'd

6. Do you pasture livestock in the fields abutting this Regional Road?
Yes ________
No ________
If yes, how many? (total number) ____________

7. Traffic Patterns

We would like you to think of each time you travel on this access road with a piece of farm machinery or equipment. First of all, on the chart below, identify all the different machines and machinery combinations that you move on or across the access road. Then, estimate the average mileage per trip and the number of trips. If you need additional space, please use the back of this page.

		No. of Times - Choose One from Below			
Description of Machine or Machine Complement	Distance Travelled per round trip? (miles)	Year	Month	Week	Day

8. Truck Traffic

a) Could you indicate the type and frequency of vehicle traffic turning in and out of your laneway on a regular basis?

	(check)	per month	OR per year
milk truck			
feed truck			
livestock truck			
customers for:			
fruit or vegetable stand			
"pick-your-own"			
other ____________			
none			

b) Do you need to move livestock across the access road?
Yes ________
No ________
(CHOOSE ONE) Number per year ____ or month ____ or week ____

9. On the chart below, please indicate the farm water supply and its use.

	Use (check below)		
Water Supply	Livestock	Irrigation	Domestic
drilled well			
dug well			
stream			
cistern			
municipal main			
other (eg. ponds)			

5. The interviewer marked the location of the farm residence on the 1:10,000 scale working map.
6. Only the socio-economic questionnaire was dropped off at non-farm residences. The respondents were requested in a letter to mail the form to I.E.R. The farm interviewers had no further involvement with these properties.
7. After two days, the interviewer returned to the farm residences, reviewed the completed form with the respondent, or arranged a time when they could return to pick it up.
8. If a respondent could not be contacted after two call backs, the interviewer left a stamped envelope with a letter requesting that the interview form be completed and mailed to Ecologistics Limited.
9. If during a call-back it was discovered that the resident of a house was a non-farmer and a non-resident tenant farmed part or all of the land, the interviewer obtained the name and telephone number of the tenant. The resident was requested to fill out the I.E.R. section of the questionnaire and this was collected and forwarded by the interviewer to I.E.R.
10. Tenants who were identified in Step 10 and in Question 2 of the interview from were phoned to arrange for an interview.

During December 5-12, 1984, farm tenants who had been identified in Step 10 and in Question 2 of the interview forms which had been mailed back were telephoned for an interview. Of a total of 16 tenants, nine interviews were completed. Seven tenants were not found.

3.3.4 Response Rates

The interview response rates are shown in Table B-4. Of a total of 116 delivered questionnaires 71 farm questionaires were obtained (collected and mailed back). Of the remainder, four refused to fill out the form,

TABLE B-4

COVERAGE OF ACCESS ROAD INTERVIEWS OUTSIDE THE AGRICULTURAL VICINITY

Road	Total No. of Surveys Delivered	No. of Surveys Collected	No. of Mail Backs Received	No. of Mail Backs Not Received	No. of Refusals	No. of Non-Farm Parcels
Victoria (RR 24)	40	25	2	6	1	6
Hwy 20	18	13	1	3	1	0
RR 65	12	8	2	2	0	0
RR 27	6	3	0	3	0	0
Elcho Rd.	2	0	1	1	0	0
Montrose Rd.	1	1	0	0	0	0
Schisler Rd.	3	0	0	3	0	0
Trafalgar Rd.	12	3	3	5	0	1
Fourth Line	5	2	0	2	1	0
Fifth Line	3	0	0	1	1	1
Bronte Rd.	3	0	0	2	0	1
Hwy. 10	7	1	3	0	0	3
Derry Rd.	4	3	0	0	0	1
TOTALS	116	59	12	28	4	13

and 28 were not mailed back to Ecologistics Limited. Thirteen residences which appeared to be farm headquarters (owned or rented) were the homes of non-farmers or retired farmers.

3.3.5 Compilation of Interview Data

The following outlines the procedure undertaken to compile the data obtained from both phases of the surveys.

3.3.5.1 Missing Information - A comparison was made between the total number of farmed parcels accounted for during both surveys and the total number of farmed properties. Listed in Table B-5 column 1 are the total number of farmed parcels identified by the Ministry of Revenue Assessment Rolls. These are divided into those with and without farm headquarters (columns 2 and 4 respectively). In columns 3 and 5 are the total number of parcels covered by the surveys.

Estmates of the missing farming activities for parcels not covered in the surveys were determined by utilizing data sources prepared for other aspects of the Phase 4A agricultural analysis. These sources include the agricultural vicinity questionnaire, the 2-5 km livestock inventory, the 2-5 km land use systems mapping, and the crop inventory along access roads.

The procedure for estimating the information for each property is outlined below:

Farm machinery movements - The average number of trips per implement reported by similar farms along the access road were multiplied by half the length of the access road. This was doubled to account for return trips.

TABLE B-5

SUMMARY OF ACCESS ROAD SURVEY COVERAGE

Road	Total No. of Farmed Parcels	Total No. With Farm Headquarters	No. With Farm Headquarters Covered	Other Farmed Parcels (No Headquarters)	No. of Farm Parcels Covered (No Headquarters
Trafalgar Rd.	18	8	5	10	3
Fourth Line	21	11	8	10	7
Fifth Line	17	9	5	8	5
Britannia	30	16	12	14	10
Bronte	25	8	4	17	9
Derry Rd.	4	2	1	2	2
Biggar	5	1	1	4	2
Carl	10	4	3	6	4
Young	6	2	1	4	4
Schisler	6	4	0	2	1
Montrose	4	1	1	3	3
Crowland	8	3	1	5	4
Regional Rd. 24	50	24	19	26	9
Highway 20 to Schram Rd.	18	12	9	6	4
Highway 20 (Schram Rd to Bismark)	26	19	17	7	4
Regional Rd. 65	15	9	7	6	4
Regional Rd. 27	10	4	3	6	2
Krick Rd.	12	1	1	11	11
Elcho Rd.	21	15	13	6	3
Derry Rd.	4	0	0	0	0
Highway 10	6	2	2	4	4
Schram Rd.	3	2	2	1	1
TOTAL	319	157	115	158	96

Customer stops - If it appeared that there were retail sales at a farm (signs, fruit stands) the average number of stops reported by similar farms in the area was used. If there were no farm headquarters, no customer stops were recorded.

Service vehicle stops - The average number of stops reported by similar farm operations in the local area were determined. If there was no farm headquarter, no service vehicle stops were assigned to the property.

Cropland with access points from the roads - The area of cropland was measured from the 1:10,000 crop and livestock maps and the crop survey maps.

Livestock and poultry - The 1:10,000 crop and livestock maps and the 1:25,000, 2-5 km livestock inventory maps were reviewed for the location of livestock and poultry. The values reported in the surveys were used.

Cattle crossings - If there were livestock identified on a property, and another parcel was owned by the same operator on the access road, the average number of yearly crossings reported by other farmers in the area was used. If no other property was owned, or if there were no livestock or pasture on the parcel, no crossings were recorded.

Data Compilation

Some of the data recorded on the interview forms were aggregated for comparison purposes. The farm traffic information requested in Question 7 could be answered by the number of trips per day, week or month. This was aggregated to the km travelled per year using the following assumptions:

trips/week = 5 days
one month = 4.5 weeks.

Some operators reported trips for specific intervals such as summer months. These were assumed to be the following:

summer road use for customer stops at road stands = 3 months
the growing season = 7 months
spring to fall = 7 months.

Customer stops and service vehicle movements and cattle crossings in Question 8 were aggregated to a yearly number per year. Customer stops included stops at garden centres and nurseries, fruit stands and pick your own operations, riding schools and horse stable customers. Service vehicles include feed and livestock trucks, fruit and vegetable trucks, milk trucks, fuel and water trucks.

Animal units

In order to compare different types of livestock the numbers were converted to animal units and summed for each access road.

Animal unit equivalents are:

	Animal Unit
cattle and horses	1.0
pigs	.22
chickens	.011
turkeys	.011
other livestock	.05

The animal unit equivalents were adapted from the TDN consumption units described in Appendix A.

3.3.6 Results

The data collected in the access road surveys and estimated for missing information are shown in Table E-2, Appendix E.

3.4 SURVEY OF CROPS ALONG ACCESS ROADS

3.4.1 Purpose

An inventory of field crops was undertaken to determine on a field by field basis the crops being grown adjacent to the access road options.

3.4.2 Study Areas

Crops within 800 m either side of the access roads were obtained for all access route options extending from the agricultural vicinity study area to the 400 series highways. Crop data collected in the vicinity farm survey provided information for this area.

3.4.3 Crop Survey Procedures

The survey was undertaken in two steps, a roadside survey, and an aerial survey. The aerial survey was employed to fill in information for areas which could not be seen from the road. The roadside survey was undertaken in August, 1984 and the aerial survey in September, 1984. The procedure for the survey is summarized as follows:

1. A 1600 m band centred on the road was marked on 1:10,000 scale photomosaic strip maps.
2. Two surveyors drove the roads and marked crop types and land uses on the photomosaic maps according to the following codes:

MAP CODE	SPECIALTY CROPS	MAP CODE	FIELD CROPS
Sf	Sunflower	Fs	Flaxseed
So	Soybeans	Rs	Rapeseed
Bd	Dry field beans	Ms	Mustard seed
B	Beans (wax, green, snap)	Ba	Barley

MAP CODE	SPECIALTY CROPS
As	Asparagus
Br	Broccoli
C	Cabbage
Cf	Cauliflower
Cu	Cucumber
L	Lettuce
Pgr	Green peas
On	Onions
Po	Potatoes
SB	Sugar beets
Car	Carrots
Tu	Turnips
N	Nurseries
Sod	Sod
To	Tomatoes
App	Apples
Pe	Pears
P/P	Plums/prunes
Ch	Cherries
Pc	Peaches
Apr	Apricots
Sb	Strawberries
G	Grapes
Sc	Sweet corn
Mkt	Market garden

MAP CODE	FIELD CROPS
Oa	Oats
W	Wheat
R	Rye
Bw	Buckwheat
So	Soybeans
Alf	Alfalfa
H	Hay
P	Improved pasture
UP	Unimproved pasture
G	Grain
MG	Mixed grain
C	Corn

MAP CODE	OTHER
Al	Idle Ag.
Z	Forest native
X	Swamp/bog
fa	Fallow
Res	Residential

3. Missing information was identified on the 1:10,000 scale photomosaics and 1:10,000 air photographs.
4. A two-person survey crew flew the access route options and recorded the missing information.

3.4.4 Data Compilation

Complete coverage of crops was obtained for the access route options. The working maps are on file at Ecologistics Limited.

Crops were subsequently grouped into the following categories and entered into the Phase 4A Access Road matrix (Table E-3, Appendix E).

Crop Categories

Small Grains

- winter wheat
- oats
- barley
- mixed grains
- rye
- buckwheat
- small grain

Forage Crops

- hay
- pasture

Nurseries & Sod

Row Crops

- corn
  fodder corn
  grain corn
- soybeans

Fruits & Vegetables

- sweet corn
- pumpkins
- vegetables
- fruit
- strawberries
- orchard
- grapes

The hectares of crops were summed for each category according to the following procedure:

1. The cropped land was measured on the 1:10,000 photomosaic base using a Planix 7 electronic planimeter.
2. At intersections where the 1600 m bands overlap, the crops were measured only once.
3. Cropped land on candidate sites was not measured if the access route option was to that site. If it was not, then the data were included. For example, the access road options to LF-1E would include data for PI-27E.

4. The area of crops were summed for the local and regional provincial standard roads for each option.

3.4.5 Results

Complete coverage of 1984 crops was obtained for all of the access route options.

3.5 ASSESSMENT OF AGRICULTURAL ACTIVITIES DOWNSTREAM FROM ACCESS ROADS

3.5.1 Purpose

The number of downstream locations where livestock appear to have access to streams for watering purposes were estimated for the preferred access route options. This provided an assessment of the relative potential exposure of downstream livestock to any spills that might occur in streams crossed by access roads.

3.5.2 Study Areas

Stream crossings were identified by Gartner Lee Associates on a 1:25,000 scale topographic map. The downstream areas extending from the access roads to the lakes were identified.

3.5.3 Data Compilation Methods

The Land Use Systems Mapping (1:50,000 and 1:25,000) prepared by O.M.A.F. and Agriculture Canada were used to identify areas of pasture where livestock could be watering after a spill. The map categories used include the hay and pasture systems of O.M.A.F. and the hay and grazing systems of Agriculture Canada. Definitions are outlined in Section 3, Appendix C.

The streams identified by Gartner Lee Associates were plotted on the Land Use Systems Maps. The number of times a stream crossed or formed a boundary of one of the above-described systems was counted.

3.6.4 Results

The results are as follows:

	No. of Crossings
LF-1E	0
LF-1E/PI-27E	0
LF-3C	48
LF-9C	32
LF-4N/PI-13N	4
LF-4N/PI-1N	7
LF-2N/PI-13N	4
LF-2N/PI-1N	6

4.0 DATA COLLECTION FOR THE AIR DISPERSION ZONES

4.1 INTRODUCTION

Outlined in this section are the data sources and collection methods employed for the inventory of crops and livestock/poultry within the air dispersion zone. The ORF air dispersion model is simulated over an area extending from the incinerator stack location out to 20 km. The agricultural data collection was developed for these segments of the zone, 0-2 km, 2-5 km, and 5-20 km. Data sources for these zones are summarized in Table B-6. The procedures for compiling the data are described in Appendix C.

TABLE B-6

CROP AND LIVESTOCK/POULTRY DATA SOURCES FOR AIR DISPERSION ZONES

Zone	Data Source Crops Data	Livestock Data	Comment
0- 2 km	Site and Vicinity Farm Survey	Site and Vicinity Farm Survey	- additional data obtained during windshield and soil surveys
2- 5 km	OMAF and Agr. Canada Land-use Systems Mapping	meetings with local farmers, agricultural representatives, marketing boards and Federations of Agriculture	- a sample survey of field crops was conducted to verify Land-use Systems Mapping
5-20 km	1981 Census of Agriculture, Statistics Canada	1981 Census of Agriculture, Statistics Canada	- data were obtained at the enumeration area level

4.2 0-2 KM ZONE

Data collected in the site and vicinity farm survey were employed for both the crops and livestock/poultry in the 0-2 km zone. The 1:10,000 composite crop and livestock maps formed the basis for the analysis as this showed crops and livestock/poultry on a farm by farm basis.

4.3 CROPS IN THE 2-5 KM ZONE

4.3.1 Data Source

In the 2-5 km zone, the Land Use Systems maps of O.M.A.F. and Agriculture Canada were employed.

Both agencies have mapped combinations of crops in rotation, known as cropping systems for different regions of Ontario. Also mapped are non-farm uses and specialized agriculture such as nurseries and market gardens. The following map sheets were used:

O.M.A.F. - The Regional Municipalities of Peel and Halton (1:50,000, 1983)

Agriculture Canada - The Regional Municipality of Niagara (1:25,000, 1983)
- The Regional Municipality of Haldimand-Norfolk (1:50,000, 1984)

Descriptions of the land-use systems of the agencies are included in Table B-7 and B-8 Since there is variation in the mix and proportion of crops in some systems, they were matched according to similarities as shown in Table B-9. This is based on the match undertaken in Phase 3B of the site selection process in conjunction with O.M.A.F. personnel.

TABLE B-7

LAND-USE SYSTEMS USED BY THE ONTARIO MINISTRY OF AGRICULTURE AND FOOD

SYSTEM AND MAP CODE	DESCRIPTION
Continuous Row Crop (P):	Single intensive crop type, i.e., corn or beans. Also includes any combination of corn, white beans, soybeans or other variety of beans in rotation. The entire area except for topographically limited portions and non-systems uses must be row crop. Corn dryers and elevator storage systems are good indicators. Often barns are absent except for a machine shed(s). There must be no grain crops or hay. Usually very large fields often with no fence boundaries.
Corn System (C):	A rotation system in which corn and/or beans occupy more than 40%, but less than 100% of the area. The remainder is composed of grain and hay. A small proportion (less than 10%) may be pasture. Usually silos and corn cribs are good indicators of this system. There may also be a complex of barns which indicate feeding of dairy, beef or hogs.
Mixed System (M):	A rotational system composed of grain, corn or beans and hay in roughly equal proportions. No crop dominates the system and fields are generally small. Barns are usually the older type and silos are smaller and less numerous. Associated with a traditional farming system. Sod crops cover more than 20% of the area. Corn and beans together occupy less than 40% of the area.
Grain System (MG):	A combination of sod crops and grains in which grain is predominant, occupying more than 85% of the area and in some cases as much as 100%. The field sizes are usually large with fences often absent. A lower intensity cash cropping system. There are no row crops. Good quality hay or pasture may compose up to 15% of the area.

TABLE B-7 - cont'd

LAND-USE SYSTEMS USED BY THE ONTARIO MINISTRY OF AGRICULTURE AND FOOD

SYSTEM AND MAP CODE	DESCRIPTION
Hay System (H):	A rotational system in which good quality hay and pasture predominate. Very small amounts of corn may be present, typically less than 2 ha. Hay must be the largest proportion of the system.
Pasture System (HG):	Sod crops constitute the whole area with little or no rotation. Poor quality weedy hay and/or pasture cover more than 50% of the area. Associated with extensive or unconfined grazing of livestock. There should be minimal evidence of recent cultivation.
Grazing System (G):	Native grass pasture where topography precludes the use of machinery. Usually on poorer land where slopes, rivers, valleys, rock outcrops or shallow soils occur. Most often seen in association with another system.
Extensive Field Vegetables (KF):	Large fields of cucumbers, broccoli, tomatoes, peas, etc. Includes associated fallow or plough-down crops.
Market Gardens/ Truck Farms (KM):	Small intensive plots of lettuce, carrots, celery and the like. In general, these operations will be less than 12 ha in size and often smaller.
Sod Farms (T):	Public or commercial sale of grass sod.
Nursery (KN):	Intensive production of trees, shrubs, vines or flowers for transplant or sale. Includes associated fallow or plough-down crops.
Orchard (O):	Primarily hardy fruit production, usually with a combination of pears, plums and apples dominant. Orchard must occupy more than 90% of the area. If peaches and/or cherries occur, they must occupy less than 50% of the area.
Vineyard (V):	Primarily grape production with vines occupying more than 90% of the area.

TABLE B-8

LAND-USE SYSTEMS USED BY AGRICULTURE CANADA

SYSTEM AND MAP CODE	DESCRIPTION
Row Crops (J):	Continuous cultivation of corn and/or soybeans, without cereal grain or sod rotations. Intensive land use, usually cash crop operations.
Corn-Wheat (CW):	Primarily corn and/or soybeans, with cereal grain(s) included as an integral part of the rotation. Clover for hay or seed may be included in the rotation, and small areas of grass hay may be present, but total sod crops constitute less than 20% of total area. Intensive land use, usually cash crop operations.
Mixed (M):	A combination of corn, hay, cereal grain(s) and pasture. A typical field rotation involves: corn, corn, cereals (seeded down), clover for two years or other hay for several years, then back to corn. A certain amount of permanent or rotational pasture may be included. Sod crops cover more than 20% of area. Medium intensity land use; usually full time livestock based operations.
Cereal Grain (SW):	Cereal grains only, but may include some fallow land. Mainly winter wheat and barley with some oats or mixed grain. Medium intensity. Very little sod crops.
Hay-Grain (Gr):	A combination of sod crops and cereal grain(s). The most common rotation involves hay for several years, (clover 1-2, alfalfa-grass mix 2-7), followed by one year of cereals as a cover crop for reseeding of hay. Some permanent or rotational pasture often forms part of the cropping system. Good quality hay and/or cereals constitute more than 50% of the area, and in a few cases cereals constitute 100% of crop area. Medium to low intensity land use, usually part-time livestock based operations or an adjunct to a more intensive operation.

TABLE B-8 - cont'd

LAND-USE SYSTEMS USED BY AGRICULTURE CANADA

SYSTEM AND MAP CODE	DESCRIPTION
Hay (H):	Sod crops only, with little or no rotation. Poor quality, weedy hay and/or pasture, with minimal evidence of recent cultivation. Livestock production from this system depends primarily on established stands of perennial grass. There may be periodic reseeding of a small portion of the hay, but usually at intervals greater than ten years. Poor quality hay and pasture covers more than 50% of the area. Very low intensity, part-time or hobby farms or an adjunct to a more intensive operation.
Grazing (G):	Native grass pasture where topography precludes the use of machinery. Usually on streambanks, ravines and steep hills. As the least intensive system of agricultural land use, this category only occurs as an adjunct to another system.
Orchard	Primarily hardy fruit production, usually with a combination of pears, plums and apples dominant. Fruit >90%, peaches and/or cherries <50%.
Vineyard (V):	Primarily grape production, with vines >90% of the area.
Vegetables and Berries (K):	Vegetables, sweet corn and/or berry production, as in market gardening. Includes associated fallow and plough-down crops. Does not include vegetables or berries interplanted with fruit trees.
Nursery (N):	Intensive production of trees, shrubs, vines or flowers, for sale, transplant or seed production. Includes associated fallow or plough-down crops.
Sod (S)	Commercial sod farms.

TABLE B-9

MATCH OF LAND-USE SYSTEMS

AGRICULTURE CANADA	MAP CODE		ONTARIO MINISTRY OF AGRICULTURE AND FOOD	MAP CODE
Row Crops	J	=	Continuous Row Crop	P
Corn Wheat	CW	=	Corn	C
Mixed	M	=	Mixed	M
Hay-Grain	HG	=	Hay System	H
Hay	H	=	Pasture System	HG
Grazing	G	=	Grazing	G
Cereal Grain	SW	=	Grain System	MG
Orchard	O	=	Orchard	O
Veg. & Berries	K	=	Extensive Field Veg.	KF
Nursery	N	=	Nursery	KN
Vineyard	V	=	Vineyard	V
Sod	S	=	Sod	T
Idle Ag.	A1	=	Idle Ag.	A1
Scrubland	A2	=	Idle Ag.	A2

4.3.2 Field Check of Land Use Systems Mapping

The land use systems mapping is based on observed crops at one time. A sample field survey of crops was undertaken to verify the mix and proportion of crops within the system, and the overall representatives of the information. The procedure for compiling and checking the data is outlined below.

A windshield survey was conducted to sample the crops. Photomosaic base mapping of the Ministry of Natural Resources (Forest Stand Map Inventory, Forest Resources Inventory 1978 and 1979) at a scale of 1:10,000 were assembled for 5 km around each site. Surveyors drove along consecutive concession roads and recorded the crops observed on a field by field basis. The survey was undertaken between June 28 and August 7, 1984.

The boundaries of the land use systems were superimposed on the mapped crops. An electric planimeter was used to measure the area of each crop within a system. The proportion and type of crops in each system were recorded and compared.

Table B-10 shows the results of the comparison. Included on the table are the mix and proportion of crops observed within a system, and that used by the agencies.

A comparison of the two shows that there are significant differences between the observed mix and proportions and that this varies among sites. In subsequent compilation of the crop data, the observed proportions were used (Appendix C, Section 3).

Some specialty crops found during the field check were not identified on the land use system maps. These were added to the base mapping.

TABLE B-10

COMPARISON OF LAND USE SYSTEMS MAPPING AND OBSERVED FIELD CONDITIONS (1984)

	Proportion								Type and Proportion of Crops within the Land Use Systems of O.M.A.F. and Agriculture Canada
Crop	LF-2N	PI-13N	PI-1N	LF-4N	LF-3C	LF-9C	PI-27E	LF-1E	
Land Use System									
Row Crops/Continuous Row Crops									
Corn	.35	.27	.37	.27	.37	1.00	- -	.96	100% corn and/or soybeans
Soybean	.17	.24	.12	.26	.25	- -	- -	.04	
Oats	- -	.11	.05	- -	.08	- -	- -	- -	- -
Barley	.07	- -	.02	.04	.14	- -	- -	- -	- -
Wheat	.39	.18	.26	.32	- -	- -	- -	- -	- -
Hay	.02	.14	.08	.09	.15	- -	- -	- -	- -
Pasture	- -	.06	.10	.02	.01	- -	- -	- -	- -
Corn Wheat/Corn									
Corn	.48	.33	.21	.43	.26	.33	.59	.66	- corn and/or soybeans occupy 40%
Soybean	.09	.19	.06	.19	.12	.22	- -	.00	
Wheat	.22	.07	.19	.04	.15	.11	.07	.13	
Barley	- -	.05	.16	.05	.04	.13	.04	.05	- grains occupy up to 60% of area
Oats	- -	.07	.10	.09	.07	.00	.08	.01	
Mixed Grain	.02	.04	.03	.03	.03	- -	- -	- -	
Hay	.19	.23	.20	.14	.32	.20	.21	.14	- hay and pasture make up less than 20% of system
Pasture	- -	.02	.05	.03	.01	.01	.01	.01	
Nursery	- -	- -	- -	- -	- -	.00	- -	- -	
Mixed									
Corn	.36	.27	.22	.18	.20	.33	.57	.40	- grain, corn or beans and hay in roughly equal proportions
Soybean	.04	.02	.04	.06	.01	.02	- -	- -	
Hay	.27	.43	.36	.38	.56	.40	.25	.39	
Pasture	.05	.10	.09	.12	.08	.04	.07	.04	- sod crops occupy more than 20% of the area
Winter Wheat	.25	.08	.08	.04	.09	.09	.07	.11	
Barley	- -	.01	.06	.06	.01	.07	.03	.03	
Oats	.02	.03	.06	.11	.04	.02	- -	.03	
Mixed Grain	.00	.06	.09	.05	.01	.03	.01	- -	
Vegetables	.01	- -	- -	- -	- -	- -	- -	- -	
Hay-Grain/Hay System									
Hay	.38	.61	.30	.34	.51	.41	.55	.67	- hay and cereal grains occupy more than 50% of area
Pasture	.07	.07	.10	.17	.10	.05	.16	.12	
Oats	- -	.08	.02	.06	.06	.05	.18	.08	
Barley	- -	.04	.06	.06	.02	.08	- -	- -	- pasture forms part of the system
Winter Wheat	.15	.01	.02	.01	.09	.12	- -	- -	
Mixed Grain	.03	.11	.16	.09	.02	.00	- -	- -	
Corn	.36	.08	.34	.27	.16	.21	.10	.13	
Soybeans	.01	- -	- -	- -	.04	.08	.01	- -	

TABLE B-10 - cont'd

COMPARISON OF LAND USE SYSTEMS MAPPING AND OBSERVED FIELD CONDITIONS (1984)

Crop	Proportion								Type and Proportion of Crops within the Land Use Systems of O.M.A.F. and Agriculture Canada
	LF-2N	PI-13N	PI-1N	LF-4N	LF-3C	LF-9C	PI-27E	LF-1E	
Hay/Pasture System									
Hay	.58	.22	.26	.44	.57	.61	.53	.72	100% sod crops
Pasture	.15	.37	.14	.16	.06	.07	.06	.03	
Oats	- -	- -	.01	.04	.08	.05	.01	.00	
Barley	- -	- -	.02	.02	.02	.05	.02	- -	
Winter Wheat	.27	- -	.01	.08	.15	.12	.19	.01	
Mixed Grain	- -	.08	.08	.05	.01	- -	- -	- -	
Corn	- -	.33	.28	.14	.11	.10	.19	.22	
Soybeans	- -	- -	.20	.07	- -	- -	- -	.02	
Grazing/Grazing									
Pasture	- -	.29	.41	.54	.88	.45	- -	- -	100% pasture
Hay	- -	.71	.59	.46	.12	.55	- -	- -	and/or hay
Cereal Grain/Grain System									
Winter Wheat	.59	.11	.28	.08	.58	- -	- -	- -	85 to 100%
Barley	- -	.08	.21	.24	- -	.08	- -	- -	grains
Oats	- -	.08	- -	.02	- -	- -	- -	- -	no row crops
Mixed Grain	.01	.07	.03	- -	- -	- -	- -	- -	
Hay	.03	.21	.26	.31	- -	.16	- -	- -	
Pasture	.00	.06	.07	.03	- -	.08	- -	- -	
Corn	.32	.26	.03	.19	.42	.31	- -	- -	
Soybeans	.05	.13	.12	.13	- -	.37	- -	- -	
Orchard/Orchard									
Apples	.93	1.00	1.00	.81	.20	.65	- -	- -	90% apples, peas
Pears	.07	- -	- -	.09	- -	.35	- -	- -	
Oats	- -	- -	- -	.06	- -	- -	- -	- -	
Hay	- -	- -	- -	.04	- -	- -	- -	- -	10% hay and/or
Pasture	- -	- -	- -	- -	.80	- -	- -	- -	pasture
Vegetables and Berries/ Field Vegetables									
Vegetables	.43	.67	.16	.08	- -	- -	- -	- -	100% field
Strawberries	.35	.03	.14	.31	- -	- -	- -	- -	vegetables and
Sweet Corn	- -	.02	.66	.11	1.00	.46	- -	- -	berries
Elderberries	- -	.02	- -	.47	- -	- -	- -	- -	no corn or
Tomatoes	- -	.07	- -	- -	- -	.09	.23	- -	grain
Potatoes	- -	- -	.04	.01	- -	.09	.11	- -	
Cabbage	- -	- -	- -	.02	- -	.09	- -	- -	
Squash/Pumpkin	- -	- -	- -	- -	- -	.27	- -	- -	
Beans	- -	- -	- -	- -	- -	- -	.17	- -	
Brassica	- -	- -	- -	- -	- -	- -	.35	- -	
Peppers	- -	- -	- -	- -	- -	- -	.14	- -	
Pasture	.22	.01	- -	- -	- -	- -	- -	- -	
Grains	- -	.13	- -	- -	- -	- -	- -	- -	- -
Corn	- -	.05	- -	- -	- -	- -	- -	- -	- -

TABLE B-10 - cont'd

COMPARISON OF LAND USE SYSTEMS MAPPING AND OBSERVED FIELD CONDITIONS (1984)

Crop	Proportion								Type and Proportion of Crops within the Land Use Systems of O.M.A.F. and Agriculture Canada
	LF-2N	PI-13N	PI-1N	LF-4N	LF-3C	LF-9C	PI-27E	LF-1E	
Nursery									
Nursery	1.00	.68	1.00	1.00	1.00	- -	- -	- -	90%
Vegetables	- -	.16	- -	- -	- -	- -	- -	- -	
Corn	- -	.14	- -	- -	- -	- -	- -	- -	10%
Hay	- -	.02	- -	- -	- -	- -	- -	- -	
Christmas Trees	- -	- -	- -	- -	- -	1.00	- -	- -	
Sod									
Sod	- -	1.00	- -	- -	- -	- -	- -	- -	100%
Wheat	- -	- -	- -	- -	- -	- -	.42	- -	
Corn	- -	- -	- -	- -	- -	- -	.58	- -	

Local farmers surrounding PI-13N expressed concerns about the accuracy of mapping of specialty crops, nurseries and market gardens within the study areas. Consultants mapped all of these within 5 km of the site on 1:10,000 air photos (flown May 24, 1985) and reviewed the information with the farmers on October 30, 1984. Several field boundaries were modified east of Trafalgar Road and south of Britannia, but no new fields of specialty crops were identified. A tropical plant greenhouse was added north of Britannia Road.

4.4 LIVESTOCK AND POULTRY POPULATIONS WITHIN THE 2-5 KM ZONE

4.4.1 Data Sources

An inventory of the livestock and poultry population within the 2-5 km zone was undertaken to determine the type and number of animals on a farm-by-farm basis. The sources are described below and summarized in Table B-11.

Agricultural Representatives or other staff members of O.M.A.F. County offices were asked to locate on 1:50,000 scale maps all farms with livestock and/or poultry within 2-5 km of the site, and provide estimates of the type and number of animals.

Marketing Boards provided information on their members' location and quota by livestock type. They were requested to provide the information for the 0-20 km air dispersion study zone. The Marketing Boards for turkey, egg and chicken producers provided the type and size of basic quotas of producers by lot and concession number with the stipulation that all individual quota information be kept confidential. The Ontario Milk Marketing Board would not provide information on an individual basis but did provide the total Milk Production, Annualized Group 1 Quota, Market Sharing Quota and Marketing Potential for each of the study zones.

TABLE B-11

INFORMATION SOURCES FOR THE 2-5 km ZONE LIVESTOCK AND POULTRY INVENTORY

SOURCE	SITE
Ontario Ministry of Agriculture and Food	
Cal Holden, Agr. Rep., Niagara South	LF-3C, LF-9C
Heather Richardson, Assoc. Agr. Rep. Niagara North and South	LF-3C, LF-9C, LF-1E, PI-27E
Rodd Stork, Agr. Rep., Niagara North	LF-1E, PI-27E
Phyllis McMaster, Agr. Rep., Halton	LF-4N, PI-1N, PI-13N
Doug Miller, Agr. Rep., Peel	LF-4N, PI-1N, LF-2N
Federation of Agriculture	
Halton	LF-4N, PI-1N, LF-2N
Niagara	LF-1E, PI-27E
Marketing Boards	
Turkey Producers Egg Producers Chicken Producers Ontario Milk*	all
Chippawa Watershed Association	LF-3C
West Lincoln Task Force Against Toxic Waste	LF-9C
Site and Vicinity Farm Surveys	all

* provided aggregated data by study zone, not on an individual basis.

The Chippawa Watershed Association had conducted an inventory of dairy farms within 5 km of the boundaries of LF-3C site. At a meeting, group members provided to the agricultural consultant the survey data for dairy farms. They also identified other types of livestock operations on 1:50,000 scale maps and provided estimates of the type and number of animals. Where details of the operations were not complete, the group checked further and provided the information wherever possible.

The West Lincoln Task Force Against Toxic Waste had also conducted a survey of all farms within 5 km of the site centre of LF-9C. Members plotted the location of farms on the base map and provided details of the animal numbers by type. Additional information was provided in subsequent correspondence.

Members of the Niagara Federation of Agriculture located barns on a 1:50,000 scale map for LF-1E, PI-27E and provided estimates of the livestock/poultry populations. Members of the Halton Federation of Agriculture provided the same information for LF-4N, PI-1N and PI-13N.

The site and vicinity farm surveys were used for livestock and poultry information in two circumstances. First, information was used for operators who were interviewed in the 0-2 km zone but reported livestock or poultry on properties outside the 2 km study area. Second, in sites in Halton and Niagara, the 0-2 km zone of one site overlaps the 2-5 km zone of another. For example, the 0-2 km study zone of PI-1N overlaps the 2-5 km zone of LF-4N. In these cases, the livestock and poultry data collected in the farm survey were utilized. In accordance with the conditions of the farm surveys, data for individual farmers have been kept confidential.

The steps involved in compiling and checking the data are outlined below:

1. The 2 and 5 km zones were marked on 1:50,000 scale base maps for each candidate site. Where the zones of sites overlap, the sites were shown on the same map (LF-3C and LF-9C; LF-4N, PI-1N, and PI-13N; and LF-1E and PI-27E).
2. The location of barns obtained from the agricultural representatives, marketing boards, farm survey, and farm groups at LF-3C and LF-9C were plotted on the 1:50,000 scale maps, assigned a number, and the type and number of animals listed. (Information from the marketing boards and farm surveys were kept confidential.)
3. The information was reviewed by Agricultural Representatives. Each was requested to review the location of farm operations, type and number of animals, provide estimates of missing numbers and comment on the completeness of the information. As a result of their reviews, the following resulted:
    - the 5 km zone of LF-9C was field checked with the Agricultural Representative. The location of some operators was confirmed, and missing herd sizes were estimated.
    - the Agr. Rep. for Niagara South recommended that the data be reviewed by the Niagara Federation of Agriculture for LF-1E and PI-27E. He organized a meeting with the group.
    - the Agr. Reps. in Halton and Peel Region agreed that the inventory for LF-4N, PI-1N, and PI-13N was incomplete. They recommended local residents and members of the Halton Federation of Agriculture as contacts to obtain more information. The Agr. Rep. for Halton assisted in the organization of a meeting with the Halton Federation of Agriculture.
4. At meetings with the Halton and Niagara Federations of Agriculture, the information was reviewed on the 1:50,000 scale maps, revised and new farm operations added.
5. In some cases livestock information for the same farm was reported by more than one source. Where this occurred data reported by the marketing boards and in the farm surveys took precedence. In a few cases, poultry farms identified by the marketing boards were not found

in field inspections. Where this occurred the marketing boards were contacted and discrepancies were resolved.

6. Barns were plotted on final 1:25,000 scale maps, numbered, and the corresponding livestock/poultry listed on inventory sheets.

4.5 CROPS AND LIVESTOCK/POULTRY WITHIN THE 5-20 KM ZONE

The 1981 Census of Agriculture, Statistics Canada was the source of crops and livestock within the 5-20 km zone. All crops and livestock categories reported by the census were used.

The census information was obtained at an enumeration area (E.A.) level. The data covered all E.A.´s which are wholly or partially within the 20 km zone. (An enumeration area is defined by Statistics Canada as a `spatial unit usually convassed by one census representative.´ It is defined according to the following criteria: (1) Population - the number of households in an enumeration are varies between a maximum of 375 households in large urban areas to a minimum of 125 in rural areas (2) Limits - an enumeration area, being the building block of all geostatistical areas, never cuts across any geographical area recognized by the census.)

APPENDIX C

STUDY METHODS

1.0 INTRODUCTION

Outlined in Appendix C are the procedures used to convert agricultural data into a form suitable for conducting the comparative evaluation of sites.

This supplements Chapter 6 by elaborating on the development of the following indicators:

- soil capability - site and community study areas
- crop and livestock exposure to fugitive and stack emissions - regional study area
- gross farm revenue - site and regional study area
- agricultural vehicle impact index - access road study areas.

2.0 SOIL CAPABILITY

2.1 INTRODUCTION

The agricultural capability of soils available for agriculture within each site acquisition area and agricultural community were summarized as Canada Land Inventory Class 1 equivalents. This section outlines the methodology used in the analysis and presents results for the study areas.

2.2 ASSIGNMENT OF SOIL CAPABILTIY RATINGS

Soil capability ratings for agriculture were assigned to the soil map units as discussed in Appendix B using the Ontario Institute of Pedology soil rating criteria for the Canada Land Inventory. Details of the capability ratings are contained in: Ontario Institute of Pedology, 1984, Preliminary Agricultural Soil Capabilities for Common Field Crops in the Niagara Region. The results are summarized in Table C-1.

As noted in Chpater 6, the O.I.P. released a revised set of soil capability ratings for the Niagara Region (O.I.P., 1985) after the mapping, data compilation and analysis were completed. For the purposes of the sensitivity analysis, the revised capability ratings were assigned to the soil map units in Table C-2 for sites LF-3C, LF-9C, LF-1E and PI-27E.

2.3 CLASS 1 EQUIVALENT RATING

Class 1 equivalents express the CLI capability ratings of soils as a proportion of the Class 1 agricultural land. The lower capability soils are related to Class 1 soils using empirically determined indices of the relative yield potential of field crops (Environment Canada, 1971). These classes and productivity indices are as follows:

CLI Capability Class	Degree of Limitation for Crop Production	Productivity Indices
Class 1	No significant limitations for common field crop production.	1.00
Class 2	Moderate limitations for common field crop production.	.80
Class 3	Moderately severe limitations for common field crop production.	.64
Class 4	Suitable for perennial forage crops and marginal for common field crops.	.49

TABLE C-1

ASSIGNMENT OF CANADA LAND INVENTORY RATINGS TO THE DETAILED SOILS MAPPING

LF-2N	Soil Series/Slope/Stoniness Map Units								Aggregate Soil Capability[2]			Disturbed Land
	Ch	Ch	Ch	Je	Pe	Pe	Ma	Disturbed Land				
	(B-0) (B-1) (b-1) (C-1)	(c-1)	(D-1)	(b-1)	(b-0) (C-0)	(c-0)	(b-0) (b-1)					
Capability Rating	1	2t	2^{t}_{e}	3^{d}_{w}	1	2t	3^{d}_{w}	--	1	2	3	--
Area (ha)	17	52.8	4.5	46.1	8	15.7	8.9	11	25	73	55	11
Percentage[1] of Total Site Area 164 ha	10.3	32.5	2.7	27.8	4.7	9.8	5.2	7	15	45	33	7

PI-13N	Soil Series/Slope/Stoniness Map Units					Aggregate Soil Capability				Disturbed Land
	Ch	Ch	Ch	Je	Disturbed Land					
	(b-1)	(c-1)	(H-1)	(A-1) (b-1)						
Capability Rating	1	2t	7^{r}_{t}	3^{d}_{w}	--	1	2	3	7	--
Area (ha)	61	22	2	78	3	61	22	78	2	3
Percentage of Total Site Area 166 ha	37	13	1	47	2	37	13	47	1	2

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[1] Numbers are rounded to the nearest 0.1%.
[2] Numbers are rounded to the nearest 1.0%

TABLE C-1- cont'd

ASSIGNMENT OF CANADA LAND INVENTORY RATINGS TO THE DETAILED SOILS MAPPING

PI-1N (Phase 3B Acquisition Area)	Soil Series/Slope/Stoniness Map Units											Aggregate Soil Capability				Disturbed Land
	OnCl			ChCl						Je	Disturbed Land					
	(b-1)	(c-1)	(D-1)	(B-1)	(b-1)	(C-1)	(c-1)	(D-1)	(G-1)	(A,B,b-1)		1	2	3	6	
Capability Rating	1	2t	2_{e}^{t}		1		2t	2_{e}^{t}	6t	3_{d}^{W}	--	1	2	3	6	--
Area (ha)	2.3	19.5	0.9	13.6	155.9	3.2	19.1	1.5	2	139	16	175	41	139	2	16
Percentage of Total Site Area 373 ha	0.6	5.2	0.3	3.7	41.8	0.9	5.1	0.4	0.5	37	4	47	11	37	<1	4

LF-4N	Soil Series/Slope/Stoniness Map Units						Aggregate Soil Capability			Disturbed Land
	Ch		Je			Disturbed Land				
	(b-0)	(b-1)	(A-0)	(A-1)	(b-1)		1	2	3	
Capability Rating	1			3_{w}^{d}		--	1	2	3	--
Area (ha)	79			83		6	79	--	83	6
Percentage of Total Site Area 168 ha	47			49		4	47	--	49	4

TABLE C-1 - cont'd

ASSIGNMENT OF CANADA LAND INVENTORY RATINGS TO THE DETAILED SOILS MAPPING

LF-3C (Phase 3B Acquisition Area)	Soil Series/Slope/Stoniness Map Units													
	055		056		064			065						
	(b-0)	(C-0)	(b-0)	(C-0)	(B-0)	(c-0)	(D-0)	(B-0)	(b-0)	(C-0)	(c-0)	(D-0)	(d-0)	(E-0)
Capability Rating	1	2e	3w		2d	2dt	3t	2d	2d	2^{d}_{e}	2^{d}_{t}	3t	3t	4t
Area (ha)	2.4	0.8	2.5		1.4	5.3	0.7	3.5	26.1	7	50.4	1.1	1.2	4
Percentage of Total Site Area 260 ha	0.9	0.3	1		0.5	2	0.3	1.4	10	2.7	19.4	0.4	0.5	1.5

LF-3C	Soil Series/Slope/Stoniness Map Units								Aggregate Soil Capability					Disturbed Land
	066 (G)			745			900	Disturbed Land						
	(A-0)	(B-0)	(b-0)	(B-0)	(b-0)	(c-0)	(A-0)							
Capability Rating		3^{d}_{w}		1	1	2t	5i	--	1	2	3	4	5	--
Area (ha)		118.5		0.6	0.6	2.5	22	10	3	97	124	4	22	10
Percentage of Total Site Area 260 ha		45.8		0.2	0.2	1	8	4	1	37	48	2	8	4

TABLE C-1 - cont'd

ASSIGNMENT OF CANADA LAND INVENTORY RATINGS TO THE DETAILED SOILS MAPPING

LF-9C	Soil Series/Slope/Stoniness Map Units												Aggregate Soil Capability			Disturbed Land
	055	056	064 (L)		065				066 (G)			Disturbed Land				
	(b-0)	(b-0)	(C-0)	(c-1)	(B-0)	(b-0)	(C-0)	(c-0)	(A-0)	(B-0)	(b-0)					
Capability Rating	1	3w	2^{d}_{s}	2^{d}_{t}	2d	2d	2^{d}_{s}	2^{d}_{t}	3^{d}_{w}			--	1	2	3	--
Area (ha)	1	0.4	1.1	1.2	17.1		1.6	49	50.6			4	1	70	51	4
Percentage of Total Site Area 126 ha	0.8	0.3	0.9	0.9	13.7		1.3	39.2	39.7			3	<1	56	40	3

LF-1E (Phase 3B Acquisition Area)	Soil Series/Slope/Stoniness Map Units										Aggregate Soil Capability				Disturbed Land
	064R				065R	066R		745R	056	Disturbed Land					
	(b-0)	(c-0)	(D-0)	(E-0)	(b-0)	(A,b-0)	(c-0)	(b-0)	(b-0)						
Capability Rating	2d	2^{d}_{t}	3t	4t	2d	3^{d}_{w}	3^{d}_{w}	1	3w	--	1	2	3	4	--
Area (ha)	4.6	16.2	4.3	1	102.2	114.9	0.6	2	1.2	17	2	123	121	1	17
Percentage of Total Site Area 264 ha	1.7	6.2	1.6	0.4	39.1	43.7	0.2	0.8	0.5	6	<1	47	46	<1	6

TABLE C-1 - cont'd

ASSIGNMENT OF CANADA LAND INVENTORY RATINGS TO THE DETAILED SOILS MAPPING

PI-27E	Soil Series/Slope/Stoniness Map Units															Aggregate Soil Capability					Disturbed Land
	055				056		065				066										
	(B-0)	(b-0)	(c-0)	(e-0)	(B-0)	(b-0)	(B-0)	(b-0)	(c-0)	(F-0)	(A-0)	(B-0)	(b-0)	(C-0)	(c-0)	Disturbed Land					
Capability Rating	1	1	2t	4t	3w	3w	2d	2d	2^{d}_{t}	5t	3^{d}_{w}	3^{d}_{w}	3^{d}_{w}	3^{d}_{w}		--	1	2	3	4	5	--
Area (ha)	18		5.1	1	4.8		72.7		3.2	1	14.6		46.9	5.7		8	18	81	72	1	1	8
Percentage of Total Site Area 181 ha	10		2.8	0.6	2.7		40.4		1.8	0.6	8.2		25.9	3.2		4	10	45	40	<1	<1	4

TABLE C-2

REVISED CANADA LAND INVENTORY RATINGS

LF-3C (Phase 3B Acquisition Area)	Soil Series/Slope/Stoniness Map Units													
	055		056		064			065						
	(b-0)	(C-0)	(b-0)	(C-0)	(B-0)	(c-0)	(D-0)	(B-0)	(b-0)	(C-0)	(c-0)	(D-0)	(d-0)	(E-0)
Capability Rating	2d	2de	3w		3d	3td	3td	3d	3d	3td	3td	3td	3t	4t
Area (ha)	2.4	0.8	2.5		1.4	5.3	0.7	3.5	26.1	7	50.4	1.1	1.2	4
Percentage of Total Site Area 260 ha	0.9	0.3	1		0.5	2	0.3	1.4	10	2.7	19.4	0.4	0.5	1.5

LF-3C	Soil Series/Slope/Stoniness Map Units							Disturbed Land	Aggregate Soil Capability					Disturbed Land
	066 (G)			745			900							
	(A-0)	(B-0)	(b-0)	(B-0)	(b-0)	(c-0)	(A-0)							
Capability Rating	3dw			1	1	2t	5i	--	1	2	3	4	5	--
Area (ha)	118.5			0.6	0.6	2.5	22	10	1	6	217	4	22	10
Percentage of Total Site Area 260 ha	45.8			0.2	0.2	1	8	4	<1	2	84	2	8	4

TABLE C-2 - cont'd

REVISED CANADA LAND INVENTORY RATINGS

LF-9C	Soil Series/Slope/Stoniness Map Units															
	055	056	064 (L)		065				066 (G)			Disturbed Land	Aggregate Soil Capability			Disturbed Land
	(b-0)	(b-0)	(C-0)	(c-1)	(B-0)	(b-0)	(C-0)	(c-0)	(A-0)	(B-0)	(b-0)					
Capability Rating	2d	3w	3d	3td	3d	3d	3d	3td	3dw			--	1	2	3	--
Area (ha)	1	0.4	1.1	1.2	17.1		1.6	49	50.6			4	--	1	121	4
Percentage of Total Site Area 126 ha	0.8	0.3	0.9	0.9	13.7		1.3	39.2	39.7			3	--	<1	96	3

LF-1E (Phase 3B Acquisition Area)	Soil Series/Slope/Stoniness Map Units														
	064R				065R	066R		745R	056	Disturbed Land	Aggregate Soil Capability				Disturbed Land
	(b-0)	(c-0)	(D-0)	(E-0)	(b-0)	(A,b-0)	(c-0)	(b-0)	(b-0)						
Capability Rating	3d	3td	3td	4t	3d	3dw	3dw	1	3w	--	1	2	3	4	--
Area (ha)	4.6	16.2	4.3	1	102.2	114.9	0.6	2	1.2	17	2	--	244	1	17
Percentage of Total Site Area 264 ha	1.7	6.2	1.6	0.4	39.1	43.7	0.2	0.8	0.5	6	<1	--	92	<1	6

TABLE C-2 - cont'd

REVISED CANADA LAND INVENTORY RATINGS

PI-27E	Soil Series/Slope/Stoniness Map Units															
	055				056		064	065			066					Disturbed Land
	(B-0)	(b-0)	(c-0)	(e-0)	(B-0)	(b-0)	(F-0)	(B-0)	(b-0)	(c-0)	(A-0)	(B-0)	(b-0)	(C-0)	(c-0)	
Capability Rating	2d	2d	2td	4t	3w	3w	5t	3d	3d	3td	3dw	3dw	3dw	3dw		--
Area (ha)	18		5.1	1	4.8		1	72.7		3.2	14.6		46.9	5.7		8
Percentage of Total Site Area 181 ha	10		2.8	0.6	2.7		0.6	40.4		1.8	8.2		25.9	3.2		4

	Aggregate Soil Capability					Disturbed Land
Capability Rating	1	2	3	4	5	--
Area (ha)	--	23	148	1	1	8
Percentage of Total Site Area 181 ha	--	13	81	<1	<1	4

Class 5	Severe limitations that restrict their suitability for perennial forage crops.	.32
Class 6	Suitable for pasture.	<.32
Class 7	No agricultural capability.	<.32

The procedure for calculating Class 1 equivalents is to multiply the area of each capability map unit by the index, and sum the results. The sum represents the Class 1 equivalent rating for the site. The data compilation procedures for the site and community are outlined below.

For the sites, the indices were applied to the CLI capability ratings for the on-site soil surveys described in Appendix B. The area of each soil capability class within the site acquisition area was measured on the 1:5,000 scale soils maps with an electronic planimeter.

The CLI soil capability ratings for the agricultural community were obtained from several sources. The preliminary O.I.P. capability ratings were assigned to soil types on the soil survey maps being produced for the Niagara Region. These ratings were applied to the old soils map for Welland County (sites LF-1E, PI-27E) where updated maps were not yet available.

For the study areas within the Regional Municipality of Halton, soil capability ratings were assigned to the soil types on existing soil survey maps (Table C-3). The CLI ratings were taken from the reports that accompany the soils maps. In the Regional Municipality of Peel, existing CLI mapping (1:50,000) was the source of information.

The procedure for measuring the area in each capability class are as follows:

1. All maps were photographically converted to a scale of 1:20,000.
2. The site acquisition area and community study area boundaries were drawn on each map.

TABLE C-3

SOURCES FOR THE AGRICULTURAL COMMUNITY SOIL TYPES AND CAPABILITY RATINGS

Site	Source Map for Soils Info.	Scale	Source for C.L.I. Ratings
LF-1E	Soil Survey map of County of Welland, Soil Survey Report #5 (1935)	1:126,720	Preliminary Agricultural Capabilities for common field crops in the Niagara Region, O.I.P., 1984 publication #84-2
PI-27E	Soil Survey map of County of Welland, Soil Survey Report #5 (1935)	1:126,720	Preliminary Agricultural Capabilities for common field crops in the Niagara Region, O.I.P., 1984 publication #84-2
LF-3C	Soils of the Township of West Lincoln, Preliminary map #26, O.I.P. (1981) (90% of the area)	1:25,000	Preliminary Agricultural Capabilities for common field crops in the Niagara Region, O.I.P., 1984 publication #84-2
	Soil Survey map of County of Welland, Soil Survey Report #5 (1935)	1:126,720	Preliminary Agricultural Capabilities for common field crops in the Niagara Region, O.I.P., 1984 publication #84-2
LF-9C	Soils of the Township of West Lincoln	1:25,000	Preliminary Agricultural Capabilities for common field crops in the Niagara Region, O.I.P., 1984 publication #84-2
LF-4N	Soil Survey map of Halton County (1971)	1:63,360	Soil Survey map of Halton County (1971)
PI-1N	Soil Survey map of Halton County (1971)	1:63,360	Soil Survey map of Halton County (1971)
PI-13N	Soil Survey map of Halton County (1971)	1:63,360	Soil Survey map of Halton County (1971)
LF-2N	Soil Survey Report of Peel County (1953)	1:63,360	Canada Land Inventory Soil Capability for agriculture, City of Brampton, Map N&S 30M/12

3. Areas zoned as residential, commercial or industrial (as identified by L.K.A.) were superimposed on the 1:20,000 scale maps.
4. The area of each capability class was measured with an electronic planimeter on the 1:20,000 scale map; areas zoned as residential, commercial or industrial were excluded.
5. Since the community study area includes the site acquisition area, the area of each capability class mapped by the on-site soil surveys was added to the areas measured in Step 4 above.

2.3 RESULTS

The measured areas of each class, non-agricultural uses and the derived Class 1 equivalents are shown in Tables C-4 and C-5.

3.0 CROP AND LIVESTOCK EXPOSURE TO ATMOSPHERIC EMISSIONS

3.1 INTRODUCTION

This section describes how data on the crops and livestock in the air dispersion study zones were prepared for the ORF modelling of emissions to produce indices of the relative exposure of agricultural products to facility emissions.

Since the potential for economic damage to agricultural activities provides the basis for analysis, estimated gross annual crop and livestock/poultry revenues were used to measure both crops and livestock located in the air dispersion zones. Supplementary analysis was also undertaken using a physical unit (product weight) as the basis for measurement. This formed the basis for a preliminary assessment of the relative risk associated with exposure of edible products to air emissions.

TABLE C-4

ON-SITE SOIL CAPABILITY RATINGS AND CLASS 1 EQUIVALENTS

	C.L.I. Rating (ha)								
Site	1	2	3	4	5	6	7	Disturbed Land	Total[1] Class 1 Equivalents (ha)
PI-27E	18	81	72	1	1	-	-	8	0
LF-1E (partially integrated)	2	58	67	0	-	-	-	5	91.3
LF-1E (integrated)	2	123	121	1	-	-	-	17	177.0
LF-3C	3	78	101	3	11	-	-	4	135.0
LF-9C	1	70	51	-	-	-	-	4	90.0
LF-4N	79	-	83	-	-	-	-	6	132.0
PI-1N	77	20	59	0	0	2	-	11	131.4
PI-13N	161	22	78	-	-	-	2	3	228.5
LF-2N	25	73	55	-	-	-	-	11	0

---

[1] Excludes residential, commercial, and industrially zoned land at PI-27E and LF-2N.

TABLE C-5

AREA OF SOIL CLASSES IN THE AGRICULTURAL COMMUNITY

Site	Canada Land Inventory Capability Class 1	2	3	4	5	6	7	Designated Residential Commercial and Industrial Land (ha)	Total[1] Class 1 Equivalents (ha)
PI-27E	411.7	81.0	547.2	1.0	90.9	0	37.8	986.3	856.3
LF-1E	762.1	58.0	1486.9	0	90.2	0	0	72.4	1789.0
LF-3C	36.6	1588.4	927.6	114.2	190.7	0	0	33.6	2017.9
LF-9C	72.5	720.5	1214.2	34.8	40.8	0	0	26.8	1991.1
LF-4N	1515.0	102.7	491.4	181.2	0	0	0	73.2	2000.9
PI-1N	1720.2	96.4	450.3	42.6	0	4.3	8.4	0	2107.8
PI-13N	1577.3	339.7	354.3	21.1	0	0	136.4	68.4	2086.0
LF-2N	731.9	73.0	90.9	0	83.2	0	0	575.5	875.0

[1] Excludes residential, commercial, and industrially zoned land.

The following sections deal in turn with a brief discussion of the air dispersion modelling, agricultural data compilation and results.

3.2 AIR DISPERSION MODELLING

The O.R.F. Emissions report describes the air dispersion modelling in detail. Principal features of the modelling which are of concern to the agricultural analysis are as follows:

- the stack emission source is centered on the potential location of the stack or in the case of sites with large parcel options (LF-1E) on a point lying mid-way between two potential stack locations; fugitive emissions originate from the operations area;
- the modelling zone for stack emissions extends out to 20 km and for fugitive emissions out to 5 km;
- modelling of dispersion is conducted continuously for an annual period using a gaussian plume model. One unit of a generic conservative gas is dispersed over the modelling area without deposition to estimate resulting concentrations per unit emission;
- the modelling zone is subdivided into four concentric rings measuring 0 to 2 km, 2 to 5 km, 5 to 10 and 10 to 20 km. These rings are further divided into grid cells of varying dimensions as outlined in Table C-6.

Modelling output data were mean annual and seasonal ground level concentrations at the centre of each grid cell that result from a unit emission at the stack location. These data were provided separately for stack and fugitive emissions.

TABLE C-6

DIMENSIONS OF GRID CELLS USED BY THE AIR DISPERSION MODEL

ZONE	WIDTH (meters)	ARC LENGTH (degrees)	NUMBER PER ZONE	SIZE (ha)
0- 2 km	200	22.5°	160	0.8 to 15
2- 5 km	500	22.5°	96	44 to 93
5-20 km				
(a) 5-10 km	1,000	45%	80	432 to 746
(b) 10-20 km	10,000	90%	4	23,562

The smaller grid cell areas in the inner zones enabled a more detailed description of concentrations where gradients are steeper and concentrations levels generally higher. Fewer cells are required in more distant areas since concentrations in these would be more uniform.

The O.R.F. provided a grid cell overlay and the agricultural consultants developed values for the crop, livestock and poultry presence within each grid cell. The overlay was centered on the modelling center for emissions. A north axis on the grid extending the 20 km limit was oriented to true north.

3.3 DATA COMPILATION FOR CROP AND LIVESTOCK/POULTRY REVENUES

In order to obtain one value for each cell representing all of the crops contained therein and the same for livestock/poultry, all crops and all livestock plus poultry were converted to dollar values. These values represent average gross revenues derived from unit values, area, and population data.

The data sources for the analysis are described fully in Appendix B. The mapped information obtained from the site and vicinity survey was used for the 0-2 km zone. In the 2-5 km zone land use systems mapping of O.M.A.F. and Agriculture Canada and mapping prepared from a livestock inventory were used. The 1981 Census of Agriculture was the source for the remaining 5-10 km and 10-20 km zone, hereafter described as the 5-20 zone.

Since there were several data sources, the procedures for compiling data and assigning the values for each zone are described in separate sections.

3.3.1 0-2 Km Zone

The procedure for calculating the crop information is shown in the following steps.

1. The grid cell overlay was converted to a scale of 1:10,000 and placed on the 1:10,000 crop and livestock maps (Figure C-1).
2. The area of each crop type within a grid cell was measured with an electronic planimeter. Small areas, less than 3 ha in size were estimated since measurement error for small areas is high with a planimeter.
3. The measurements were spot-checked by summing the measured areas within the cell and comparing this to the total area.

Livestock/poultry populations were determined as follows:

1. The grid cell overlay was converted to a scale of 1:25,000 and placed on top of the 1:25,000 topographic maps showing the location of barns (Figure C-2).

FIGURE C-1 EXAMPLES OF A GRID CELL OVERLAY ON CROP DATA IN THE 0-2 AND 2-5 KM ZONES

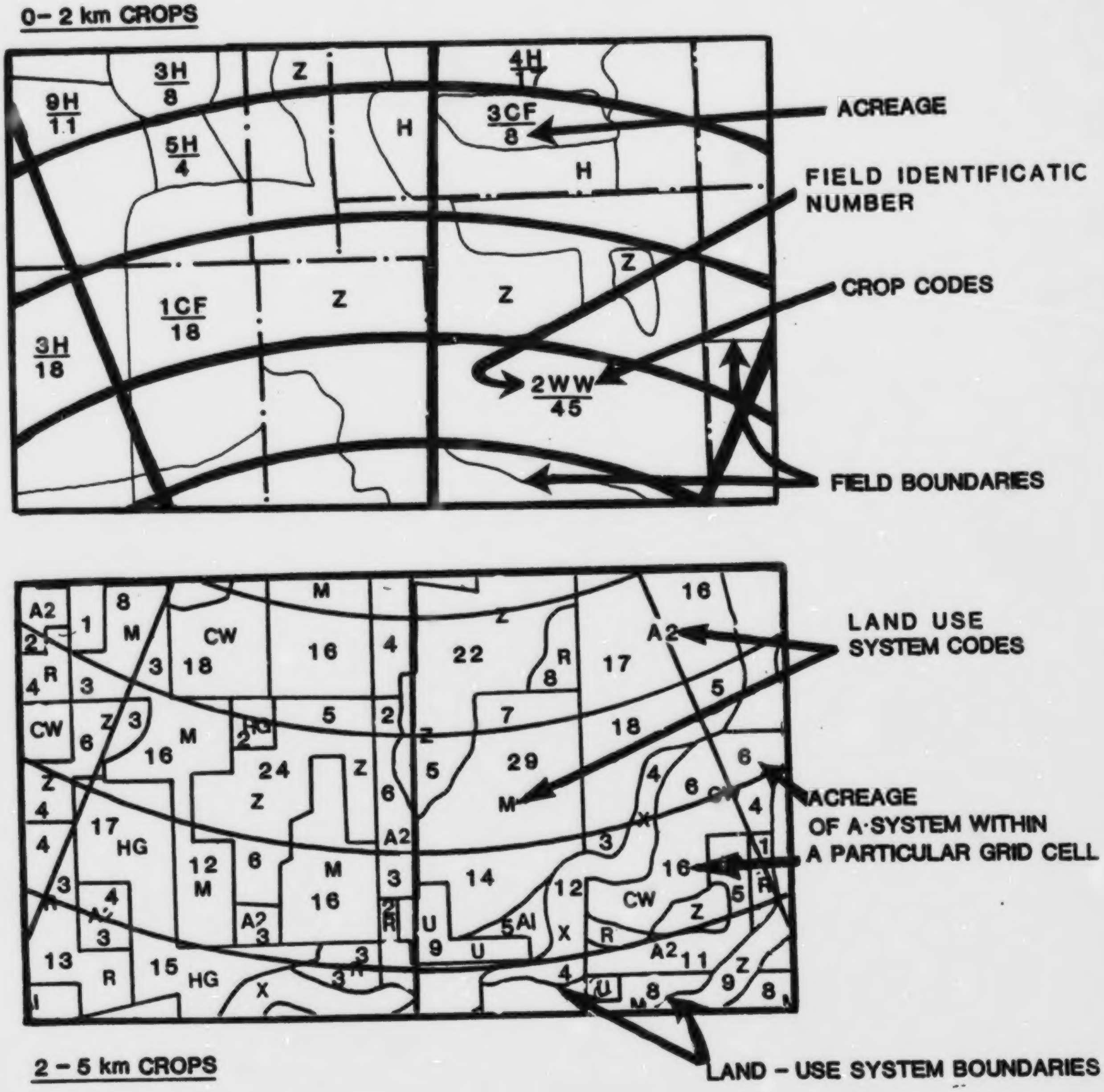
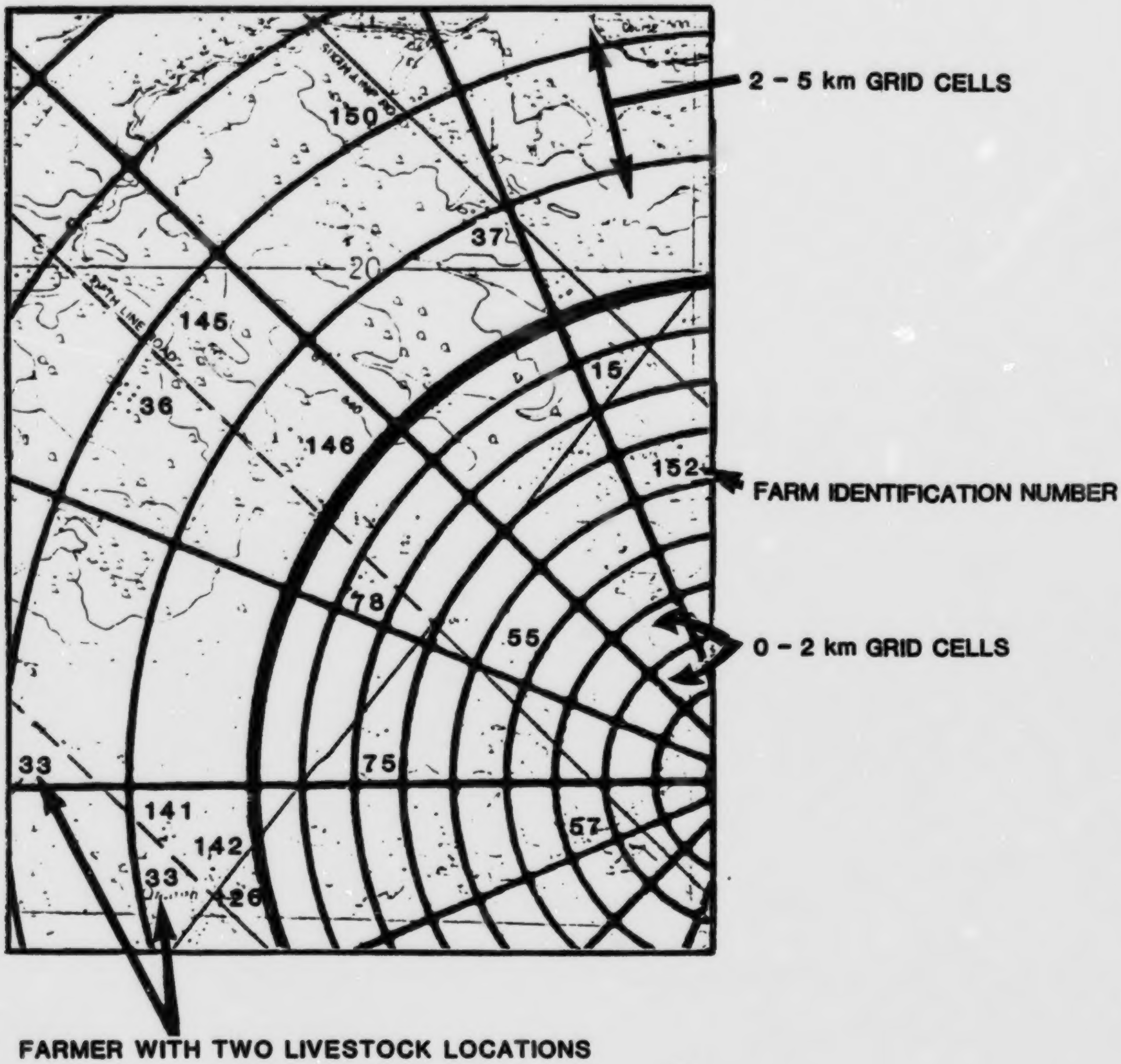

0- 2 km CROPS
ACREAGE
FIELD IDENTIFICATIC NUMBER
CROP CODES
FIELD BOUNDARIES
LAND USE SYSTEM CODES
ACREAGE OF A·SYSTEM WITHIN A PARTICULAR GRID CELL
LAND - USE SYSTEM BOUNDARIES
2 - 5 km CROPS

FIGURE C-2 EXAMPLE OF A GRID CELL OVERLAY ON THE LIVESTOCK DATA FOR THE 0 – 2 km AND 2 – 5 km ZONES

0 – 2 km AND 2 – 5 km LIVESTOCK


2 – 5 km GRID CELLS
150
37
20
145
15
36
146
152
FARM IDENTIFICATION NUMBER
78
55
0 – 2 km GRID CELLS
75
33
141
142
33
126
57
FARMER WITH TWO LIVESTOCK LOCATIONS

2. The livestock/poultry population recorded for a particular farm was assigned to the grid cell which encompassed the barn. Where there was more than one barn within a grid cell, the livestock were summed by type.

3.3.2 2-5 Km Zone

The land use systems mapping was employed for the crops within the 2-5 km zone. The 1:50,000 and 1:10,000 maps were converted to a scale of 1:25,000. The grid cell overlay was superimposed on the maps and the area of each land use system within a particular cell was measured with an electronic planimeter (Figure C-1).

The data sources and procedure for compiling the livestock information in this zone is the same as the 0-2 km zone.

3.3.3 5-20 Km Zone

In the 5-20 km zone, the 1981 Census of Agriculture was the source for both the crop and livestock information. The steps involved in the compilation were as follows:

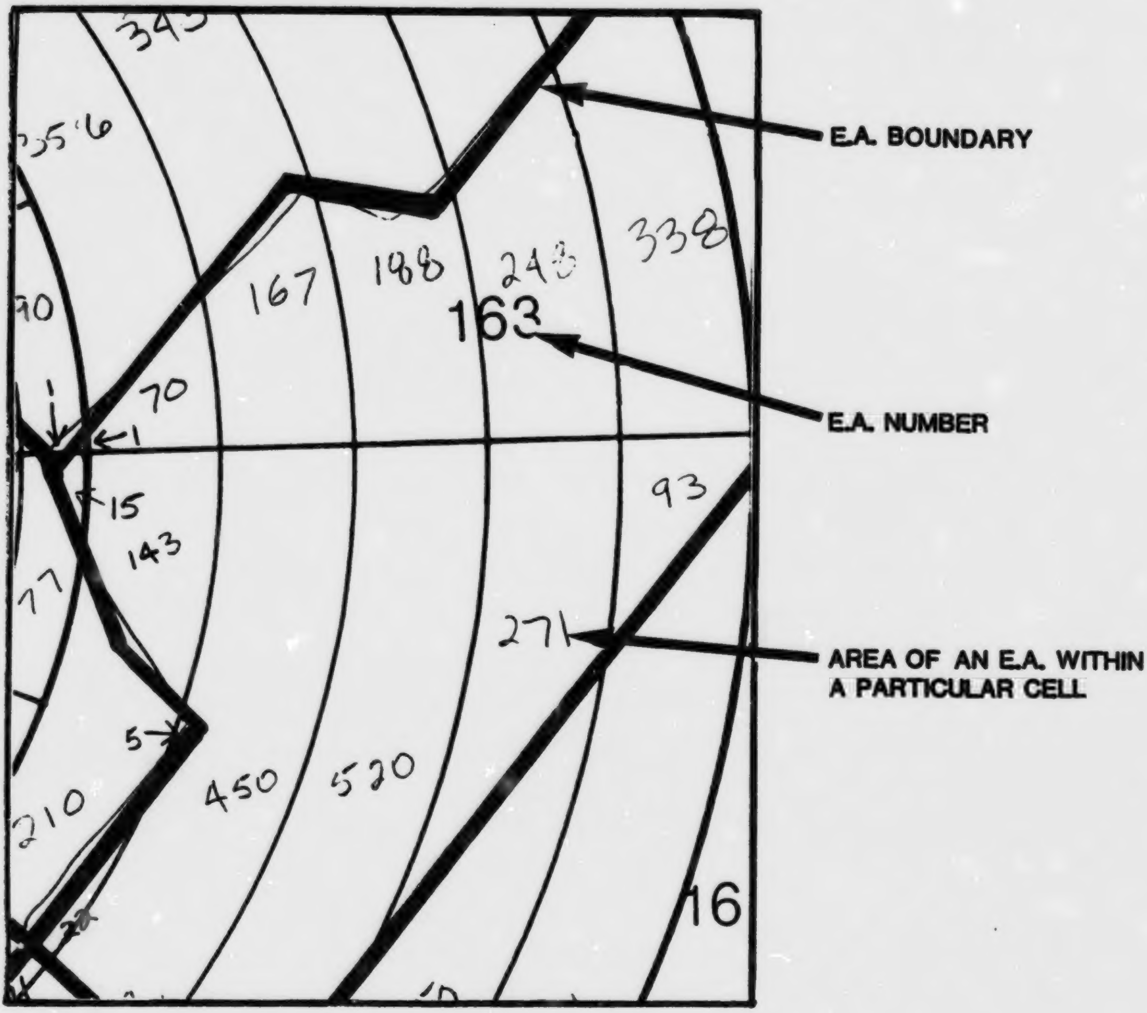
1. The boundaries of the enumeration areas provided by Statistics Canada at a scale of 1:126,000 were converted to 1:50,000.
2. The grid cell overlay was placed on top of the E.A. maps (Figure C-3).
3. The area of each E.A. within a grid cell was measured by an electronic planimeter.

3.4 ESTIMATION OF CROP AND LIVESTOCK/POULTRY REVENUE

Gross crop and livestock/poultry revenue within each grid cell were estimated as the product of the crop and livestock/poultry production times annual production values. The estimation procedures are outlined below.

FIGURE C-3 EXAMPLE OF A GRID CELL OVERLAY ON ENUMERATION AREA DATA TO DETERMINE CROPS AND LIVESTOCK VALUES IN THE 5 – 20 km ZONE

5 – 20 km CROPS AND LIVESTOCK


343
356
90
167
188
243
338
163
70
1
1
15
143
77
93
271
5
450
520
210
16
E.A. BOUNDARY
E.A. NUMBER
AREA OF AN E.A. WITHIN A PARTICULAR CELL

3.4.1 Crops

A five year (1978 to 1982) average value per hectare, based on annual O.M.A.F. statistics* were used for crops. These values were chosen rather than one year dollar values since the marked variability of crop values from year to year masks any inflationary trend.

Values in the O.M.A.F. statistics report for principal field crops are presented on a regional basis. In any case where a regional value was not available (e.g. buckwheat, fruit and vegetables) provincial values had to be used. For certain crop categories, the O.M.A.F. reports give no data. In these cases, estimates were developed as follows:

SOD - A value of \$2,000/ha was assumed based on 4,100 yd.^{2}/ac. at \$.35 to \$.40/yd.^{2} FOB** the farm gate and a two year growth cycle (personal communication, B. McNeil, O.M.A.F., Niagara Regional Office);

CHRISTMAS TREES - no data was provided in O.M.A.F. annual statistical data. A value of \$4,200/ha was assumed based on 1,200 trees/ac. at \$8 to \$10/tree (#1 wholesale) and a seven year growth cycle (personal communication, B. McNeil, O.M.A.F., Niagara Regional Office);

SWEET CORN - regional data was strongly influenced by production for canners. Higher valued market garden production was predominant within a 5 km radius of sites. A value of \$3,600/ha for this was assumed based on 23,000 plants/ac., one cob/plant, a 25% loss and a price of \$1.00/dozen (personal communication, B. McNeil, O.M.A.F., Niagara Regional Office);

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* Economics Branch, Ontario Ministry of Agriculture and Food, 1978-1982, Agricultural Statistics for Ontario, Publication 20.

** Freight on board.

NURSERY PRODUCTION - A value of $17,300/ha was assumed based on two assumptions:

i) 8,000 evergreens/ac. at $4.00/plant wholesale, a 4-5 year growth cycle, to give $8,000/ac.,

ii) 1,200 shade trees/ac. at $20/plant wholesale, a 4-5 year growth cycle to give $6,000/ac.

(personal communication, B. McNeil, O.M.A.F., Niagara Regional Office). This value was verified with estimates provided by nursery operators in the PI-13N site vicinity. Their data indicated an annual value of $17,300/ha.

CORN - Field crop surveys in the 2 to 5 km zones in Niagara and Halton regions were conducted between June and early September when it was not possible to differentiate between grain corn and fodder corn. To evaluate corn acreage, therefore, a weighted average price for corn was estimated using weights based on proportionate areas dedicated to each crop in each region. Grain corn occupied an average 76% and 79% of corn land in Niagara and Halton regions from 1978 to 1982. Field surveys in Peel Region took place in October by which time fodder corn had been harvested; corn still standing and was assumed to be grain corn.

VEGETABLES - The value/ha for market gardens were estimated using an average of 1978 to 1982 mean values for potatoes, beans, broccoli, cabbage, cauliflower, cucumber, lettuce, onions and tomatoes.

GRAIN - Young grain growing in fields could not always be identified by species. For the north sites, the value for barley was used since this is a predominant grain grown in the area. For the south sites, an average grain value was assumed for each land use system based on proportions of specific grains identified in each system. These assumptions were necessary only in the 2 to 5 km zone.

FRUIT - For orchards with a mix of trees, the average value of apple and pears was used.

ELDERBERRIES - No economic data on elderberry production is available. The "fruit" value was used for this crop.

PASTURE - (improved and unimproved) a value equal to one third the value for hay was used.

The final values assigned to crops in the 0-2 km zone are shown in Table C-7.

In order to obtain a total value for crops in the grid cells, the area of each crop was multiplied by its value/ha and summed for each grid cell. An overlay showing lands designated industrial, residential and commercial by L.K.A. was superimposed on top of the grid cells. The cells or parts of cells within these areas were assigned a value of 0.

In the 2-5 km zone, an intermediate step was required to calculate the value of crops within each grid cell. Because the actual mix and area of crops within the land use systems are not available, a weighted average value/ha of crops grown within each system was determined follows:

1. The crops observed in the field check of the land use systems (Appendix B) were multiplied by the average value/ha in Table C-7.

TABLE C-7

FIVE-YEAR CROP VALUE DATA USED WITHIN 0 TO 2 AND 2 TO 5 km ZONES

CROP	AVERAGE ($) VALUES PER HECTARE BY REGION			COMMENTS
	HALTON	NIAGARA	PEEL/HALTON	
Soybeans	536	529	536	1 (not reported for Peel and Halton, estimated according to the values for south-western Ontario)
Grain corn	586	563	603	1
Fodder corn	498	569	465	1
Corn	567	565	603	3
Oats	252	227	244	1
Winter wheat	356	287	357	1
Barley	316	297	297	1
Mixed grain	289	264	273	1
Buckwheat	180	180	180	2
Pasture	99	109	106	3
Hay	297	326	319	1
Sweet corn	3,600	3,600	3,600	3
Fruit	3,490	3,490	3,490	3
Apples	3,259	3,259	3,259	2
Pears	3,721	3,721	3,721	2
Strawberries	8,286	8,286	8,286	2
Grapes	2,165	2,165	2,165	2
Elderberries	3,490	3,490	3,490	3
Vegetables	4,949	4,949	4,949	3
Tomatoes	4,248	4,248	4,248	2
Cabbage	5,142	5,142	5,142	2
Potatoes	2,580	2,580	2,580	2
Squash and Pumpkins	940	940	940	2
Nursery	17,300	17,300	17,300	3
Christmas trees	4,200	4,200	4,200	3
Sod	2,000	2,000	2,000	3
Idle, urban, ploughed, fallow, transportation, water, swamp	0	0	0	-

NOTE:
1. Economics Branch, Ontario Ministry of Agriculture and Food, 1978-1982, Agricultural Statistics for Ontario, Publication 20.
2. Values are not reported on a county basis. Average values reported for Ontario were used.
3. See discussion in text, Pages C-23 to C-25.

2. The values were weighted according to the relative proportions of crop within a system (Appendix B, Table B-10) to determine an average value/ha for each land use system.
3. Because the mix and proportion of crops in a land use system varies between sites, a value/ha was calculated for each site. These values are shown in Table C-8.
4. The area of each land use system within a grid cell was multiplied by the crop value/ha and these were summed.

For the purposes of analysis in the 5-20 km zone, it was assumed that the area of crops reported in the census of agriculture are evenly distributed across the E.A. An average crop value/ha was estimated by multiplying the area of each crop in an E.A. by its value/ha (Table C-9) and dividing the total by the area of the E.A. (areas were provided by Statistics Canada).

A value for each grid cell was obtained by multiplying the measured area of the E.A. by its estimated value/ha. Where a grid cell encompasses more than one E.A., values were determined for each, and these were summed.

3.4.2 Sensitive Crops

Values for sensitive crops with the potential for visible damage from foliar uptake (see Chapter 6) were provided to the ORF along with values for the full range of crops grown in the air dispersion zones.

A value was obtained for each grid cell for the following crops: shown by the crop categories available in the respective data bases:

TABLE C-8

AVERAGE CROP VALUE/HECTARE FOR LAND-USE SYSTEMS IN THE 2 TO 5 km ZONES

LAND-USE SYSTEM[1]		CROP VALUE/HA BY SITE[2]							
AG. CANADA	O.M.A.F.	LF-2N	LF-4N	LF-1N	LF-13N	LF-3C	LF-9C	LF-1E	PI-27E
Row Crops	Continuous Row Crop	450	448	417	386	435	435[3]	563	563[4]
Corn Wheat	Corn	402	453	367	434	392	442	446	444
Mixed	Mixed	432	320	340	345	333	382	396	430
Hay-Grain	Hay System	317	317	364	288	295	311	306	306
Hay	Pasture System	277	309	394	303	330	358	337	321
Grazing	Grazing	N/A	151	152	238	120	208	174	174[5]
Cereal Grain	Grain System	371	372	332	357	404	458	N/A	N/A
Orchard	Orchard	3 490	2 761	3 259	3 259	723	3 423	N/A	2 685[6]
Veg. & Berries	**Extensive Field Vegetables**	5 548	5 195	4 644	4 348	3 600	2 992	3 463	N/A
Nursery	Nursery	17 300	17 300	17 300	11 901	17 300	4 200	N/A	17 300[7]
Sod	Sod	N/A	N/A	N/A	1 309	N/A	N/A	N/A	448
Vineyard	Vineyard	N/A	N/A	N/A		N/A	N/A	2 165	N/A

Notes: [1] The following systems were assigned a zero value: urban/built up, rural residental, recreation, idle agriculture, scrubland, water, forest, swamp, transport, and extraction.
[2] "N/A" indicates not applicable since the system is not found in the study area.
[3] Based on LF-3C value.
[4] Based on LF-1E value.
[5] Average of 5 estimated site values.
[6] Average of 5 estimated site values.
[7] Value from Page C-24 assumed.

TABLE C-9

REGIONAL CROP VALUE DATA

CROP	AVERAGE CROP VALUE (DOLLARS/HA) BY REGION 1978-1982				
	HALDIMAND NORFOLK	NIAGARA	HAMILTON WENTWORTH	HALTON	PEEL
Apples	3,259	3,259	3,259	3,259	3,259
Apricots	3,954	3,954	3,954	3,954	3,954
Asparagus	3,084	3,084	3,084	3,084	3,084
Barley for grain	294	297	301	316	297
Beans (wax-green-snap)	3,427	3,427	3,427	3,427	3,427
Broccoli	5,061	5,061	5,061	5,061	5,061
Buckwheat	180	180	180	180	180
Cabbage	5,142	5,142	5,142	5,142	5,142
Carrots	6,536	6,536	6,536	6,536	6,536
Cauliflower	6,324	6,324	6,324	6,324	6,324
Cherries (sour)	4,937	4,937	4,937	4,937	4,937
Cherries (sweet)	4,937	4,937	4,937	4,937	4,937
Corn for ensilage	608	568	576	499	465
Corn for grain	605	563	600	586	603
Cucumber	4,016	4,016	4,016	4,016	4,016
Dry field beans	766	766	766	766	766
Fall Rye	267	267	267	267	267
Flax seed	415	415	415	415	415
Grapes	2,165	2,165	2,165	2,165	2,165
Green peas	1,060	1,060	1,060	1,060	1,060
Improved pasture	111	109	124	99	106
Lettuce	7,875	7,875	7,875	7,875	7,875
Mixed grain	277	264	294	289	274
Oats for fodder	180	171	185	189	185
Oats for grain	240	227	250	252	245
Onions	5,884	5,884	5,884	5,884	5,884
Other fodder crops	180	171	185	188	185
Peaches	4,038	4,038	4,038	4,038	4,038
Pears	3,721	3,721	3,721	3,721	3,721
Plums and prunes	3,509	3,509	3,509	3,509	3,509
Potatoes	2,580	2,580	2,580	2,580	2,580
Soybeans	529	529	563	N/A	529
Spring rye	267	267	267	267	267
Spring wheat	334	334	334	334	334
Strawberries	8,286	8,286	8,286	8,286	8,286
Sweet corn	766	766	766	766	766
Tame hay	339	326	373	297	319
Tobacco	6,707	N/A	N/A	N/A	N/A
Tomatoes	4,248	4,248	4,248	4,248	4,248
Turnips (rutabagas)	4,448	4,448	4,448	4,448	4,448
Winter wheat	339	287	348	356	356

Source: Economics Branch, Ontario Ministry of Agriculture and Food, 1978-1982, Agricultural Statistics for Ontario, Publication 20.

0-2 km	2-5 km	5-20 km
fruit	orchard	apple
vegetables	vegetables and berries	apricot
strawberries		plum and prune
	vinelands	cherry (sweet and sour)
		peach
		asparagus
		beans (wax, green, snap)
		broccoli
		cabbage
		cauliflower
		cucumber
		lettuce
		tomato
		potato
		pea

3.4.3 Livestock and Poultry

Estimates of the annual gross income derived per animal are based on the number of animals housed in an operation at one time. As shown in Table C-10, the level of detail and units of measurements vary because of the numerous data sources employed. Consequently, the following variables were considered in deriving the dollar values:

1. Total animal population or capacity per operation.
2. Annual output of product per animal (e.g. milk, eggs).
3. Turnover of meat animals per year based on time required to finish animals.
4. Replacement of breeding stock.
5. Rates of reproduction.
6. Recent dollar values for livestock/poultry and their products.

TABLE C-10

CATEGORIES OF LIVESTOCK/POULTRY DATA COLLECTED FOR THE AIR DISPERSION ZONES

0-2 KM ZONE
(farm survey)

boars
sows
replacement gilts
pigs (less than 2 months)
feeder pigs (older than 2 months)

bulls
dairy cows
dairy cows (less than 1 year)
replacement heifers (older than 1 year)
beef cows
beef calves (less than 1 year)
replacement heifers (older than 1 year)
feeder cattle

layer hens
broilers
chickens
horses

other: geese
ducks
rabbits
sheep

2-5 KM ZONE
(marketing boards, agricultural representatives, farm residents and groups)

sows
hogs
farrow to finish
sows - weaner

total dairy herd
dairy
heifers
steers
beef feedlot
milk quota
cow-calf
beef slaughter
veal calves

pullets
broilers
chicken - quota broilers
quota broilers - Class 2
quota broilers - basic
quota roaster - Class 2
breeder hens - broiler type
breeder hens - egg type
horses
sheep
goats
rabbits
geese
turkeys - roaster Class 1
turkeys - roaster Class 2
turkeys - broiler
mink
beehives

5-20 KM ZONE
(Census of Agriculture)

boars
sows
pigs <45 lbs.
pigs 45-130 lbs.
pigs >130 lbs.

bulls
cows for milk
heifers for milk
cows for beef
heifers for beef replacement
heifers for slaughter
steers
calves

hens for laying
pullets for laying
all other chickens

turkeys

geese
ducks

lambs
ewes

horses
goats
rabbits

The specific assumptions, data inputs and final values are shown in Table C-11. The procedures for assigning the values to grid cells in each of the zones are outlined below.

In the 0-2 and 2-5 km zone, the total number of livestock/poultry types reported in each grid cell were multiplied by the total annual revenue per animal (Table C-11) and summed.

In the 5-20 km zone where the livestock/poultry are reported on an E.A. basis it was assumed that there is an even distribution with each E.A. The numbers in each census category were multiplied by the annual revenue per animal, summed, and divided by the total area of the E.A. to give an average value of livestock/ha. This value/ha was multiplied by the measured area of an E.A. within a grid cell. The result represents the revenue from that particular portion of the E.A. Where there was more than one E.A. within a grid cell, the values were derived for each E.A. and summed.

The livestock/poultry categories reported in the census of agriculture are not as specific as other sources. Consequently, some additional assumptions were made regarding the values that would be assigned to the census categories. These are outlined in Table C-12.

3.5 ESTIMATION OF AGRICULTURAL RESOURCES IN NEW YORK STATE

The outer northeast grid cell in the 5 to 20 km zone for sites LF-1E and PI-27E covered rural areas in Niagara County of New York State. The 1978 U.S. Census of Agriculture (Vol. 1, part 32, AC78-A-32) provided crops and livestock inventory data for Niagara County. These data were treated in the same manner as the Canadian EA data to generate crop and livestock value data per hectare for Niagara County. Values used in this calculation are those given in Tables C-11 and C-12.

TABLE C-11

ANNUAL LIVESTOCK AND POULTRY REVENUE

Livestock type and Measure	Value (annual dollar revenue per animal)	Data and Assumptions
1. Dairy Cattle (number of milk cows)	1,760	- 80% of cows are milked - 4,800 kg milk/cow year - $43.00/hectolitre - 103 kg/hectolitre - sale of livestock = 10% of gross milk sales
Milk Quota (litres/day)	159	
2. Beef Cattle:		
- Cow/Calf Operation (number of cows)	370	- 0.75 calves/cow - $450.00/calf at weaning - 30% turnover of breeding stock at $550./head - heifer calf replaces each cow sold
- Feedlot Operation (number of feeder cattle)	2,390	- steers sold at 1,050 lb live weight for $.81/lb - 130 days to finish a steer
- Veal (number of calves)	840	- $300.00/calf - calves turned over 2.8 times/year
- Integrated Operation-Calving to finished steers (number of cows)	550	- see "cow/calf" for production assumptions - finished animals sold as for feedlot
3. Sheep (number of ewes)	86	- 1.2 lambs/ewe - 30% turnover of ewes and replacement with lambs - lambs sold at 90 lb for $.80/lb - ewes sold at 150 lb for $.35/lb - $5.00 worth of wool annually/ewe

TABLE C-11 - cont'd

ANNUAL LIVESTOCK AND POULTRY REVENUE

Livestock type and Measure	Value (annual dollar revenue per animal)	Data and Assumptions
4. Goats (number of does)	530	- 2,000 lb of milk per doe at $.20/lb - 2.2 kids/doe at $60.00/kid
5. Rabbits (number of rabbits)	46	- 8 weeks to raise a finished rabbit - $7.00/animal
6. Hogs:		
- Farrow to Weaner Operation (number of sows)	850	- 16 piglets/sow at $50.00/piglet - 30% turnover of breeding stock with replacement gilts from piglets - $200.00/sow sold
- Farrow to Finish Operation (number of sows)	1,940	- see "Farrow to Weaner" for assumptions - finished hog sold at $120.
- Feeder Hog Operation (number of hogs)	280	- finished hog sold at $120. - hogs turned over at 2.3 times/year
7. Hens:		
- Egg Production for sale (number of hens)	17	- 240 eggs annually/hen sold for $.07 a piece - hens replaced annually and sold for $.40 each
- Broiler and Roaster Chickens (number of chickens)	8	- 1.8 kg birds sold for $1.18/kg - 4 crops per year
- Chicken Quota Broilers and Roasters (kg/year)	1.18	

TABLE C-11 - cont'd

ANNUAL LIVESTOCK AND POULTRY REVENUE

Livestock type and Measure	Value (annual dollar revenue per animal)	Data and Assumptions
- Breeder Hens for Layers (number of hens)	29	- 180 eggs annually/hen sold for $.16 a piece - hens replaced annually and sold for $.40
- Breeder Hens for Broilers (number of hens)	28	- 112 eggs annually/hen sold for $.22 a piece - hens replaced every 60 weeks and sold for $3.00
8. Turkeys:		
- Broiler (number of birds)	21	- 3 crops/year - 4.5 kg/bird - $1.55/kg
- Heavy (number of birds)	18	- 1 crop/year - 12 kg/bird - $1.50/kg
- Roaster Turkey Quota (kg/year)	1.55	
- Heavy Turkey Quota (kg/year)	1.50	
9. Ducks	22.5	- 4.5 crops/year - $5.00/duck
10. Geese	32	- 2 crops/year - $16./goose

TABLE C-12

ANALYSIS METHODS FOR ASSIGNING VALUES TO CROP AND LIVESTOCK/POULTRY CENSUS DATA

Available Livestock Data	Required Measure	Adjustments Made
Sows	-broken down by farrow to weaner and farrow to finish	-total sows apportioned between the two types of operations using breakdown observed in the 0-5 km zone of the 8 sites
Pigs 45-130 lb and Pigs 130 lb +	-number of feeder hogs	-number of feeder hogs assumed equal to total pigs (45 lb+) minus pigs in farrow to finish operations (=7.85 x sows)
Cows for Milk	-cows for milk	-no adjustment
Cows for Beef	-broken down by cow/calf and integrated operations	-total cows for beef apportioned between the two types of operations using the observed breakdown in the 2-5 km zones of the 8 sites
Steers and Heifers for Slaughter	-number of animals in feedlots	-number of feedlot animals assumed equal to steers plus heifers for slaughter minus slaughter animals in integrated operations (=.45 calves per cow)
Calves	-number of veal calves	-no analysis of veal calves using EA data
Hens for Laying	-hens for laying	-no adjustment needed
All other Chickens	-broilers and breeder hens	-all assumed to be broilers
Turkeys	-broiler and heavy	-all assumed to be broilers
Ewes	-ewes	-no adjustment needed
Goats	-does	-all assumed to be does
Rabbits	-rabbits	-no adjustment needed

3.6 DATA COMPILATION FOR CROP AND LIVESTOCK POULTRY POULTRY WEIGHTS

A parallel analysis was undertaken by O.R.F. in which crop and livestock data were included in a risk factor dealing with risk to human health via the indirect pathways of crops and livestock. For this purpose measures of the total weight of edible product generated by agriculture in each grid cell were provided to O.R.F.

Total product weight provides a convenient value that is related directly to ingestion and the possibility of bioaccumulation of toxicants. The measurement units are weights of harvested crop per hectare, the dressed weight of marketed livestock and poultry and the weight of marketed eggs and milk. These values are provided for the 0-2 km and 5-20 km zones in Table C-13 and for the 2-5 km zone in Table C-14.

No attempt was made at standardizing measurement units using, for instance, dry weight, weight of protein or total calories. Nor was any distinction made between different types of food products. This reflects a simplifying assumption that all ingested products could potentially be involved in bioaccumulation. While this assumption is clearly an over simplification, data were not available to permit a refinement that would account for the relative rates of assumption of toxicants in different types of food product. The measures derived here provide only for an approximate assessment of relative risk. They constitute an improvement over the revenue based measures simply because they rely on physical rather than economic input data.

Non-edible products, such as nursery products, were assigned a zero weight in the analysis. Crops consumed by livestock were given full weight since these are indirectly ingested by humans.

The analysis using weight data exactly paralleled the analysis using revenue data in the 0-2, 2-5 and 5-20 km zones. The only change in the methodology was that revenue value data were replaced by product weight data (kg) in the calculations.

TABLE C-13

AGRICULTURAL PRODUCT WEIGHTS USED TO DEVELOP A RELATIVE RISK OF EXPOSURE INDEX ASSOCIATED WITH AGRICULTURE IN THE 0-2 KM AND 5-20 KM AIR DISPERSION ZONES

WEIGHT (kg/yr)

	AVERAGE FOR ONTARIO	HALDIMAND NORFOLK	HAMILTON WENTWORTH	PEEL	HALTON	NIAGARA
CROPS						
grain corn		5134	5071	5134	4821	4758
fodder corn		29200	26900	24700	26900	26900
winter wheat		2549	2616	2683	2683	2146
spring wheat	2543					
barley		2790	2844	2790	2952	2737
oats		2205	2205	2205	2243	1976
mixed grain		2504	2683	2460	2683	2370
hay		7200	7400	6200	6700	7200
buckwheat	1207					
triticale		N/A*	N/A	2460	2683	2370
soybeans		1945	2146	2012	2012	2012
rye	2153					
pasture		N/A	N/A	2067	2233	2400
improved pasture		2400	2466	2067	2233	2400
other fodder crops		2205	2205	2205	2243	1976
sweet corn	11180					
dry field beans	1576					
green peas	3555					
fruits (0-2 km zone)	11866					
apples	13649					
pears	10084					
peaches	7741					
plums and prunes	5880					
cherries (sweet and sour)	5818					
elderberries	11866					
strawberries	8495					
tomatoes	41790					
potatoes	23344					
cabbage	40807					
brassica	23498					
squash/pumpkin	28956					
beans	6305					
asparagas	1677					
broccoli	8804					

* N/A - not required for the areas covered by the study zone.

Source: Economics Branch, Ontario Ministry of Agriculture and Food, 1982 and 1983 Agricultural Statistics for Ontario, Publication 20.

TABLE C-13 - cont'd

AGRICULTURAL PRODUCT WEIGHTS USED TO DEVELOP A RELATIVE RISK OF EXPOSURE INDEX ASSOCIATED WITH AGRICULTURE IN THE 0-2 KM AND 5-20 KM AIR DISPERSION ZONES

WEIGHT (kg/yr)

	AVERAGE FOR ONTARIO	HALDIMAND NORFOLK	HAMILTON WENTWORTH	PEEL	HALTON	NIAGARA
CROPS - cont'd						
carrots	64285					
cauliflower	20884					
cucumber	19967					
lettuce	21520					
onion	42260					
turnips	43736					
grapes	6278					
tobacco		2161	N/A	N/A	N/A	N/A
flax	1381					
LIVESTOCK						
boars	0					
sows - weaner	34					
sows - farrow	34					
replacement gilts	0					
<2 months	0					
feeder pigs	177					
dairy cows	3938					
milk quota	387					
cow/calf	83					
cow/feeder	857					
veal calves	248					
feeder calves (steers and slaughter heifers in the Census of Agriculture)	774					
layer hens	15.4					
other chickens	5.2					
chicken quota						
(broilers-basic)	5.2					
(broilers-Class 2)	5.2					
quota roasters	1.3					
breeder hens	1.4					
turkeys	10					
turkeys (roasters)	10.5					
turkeys heavy	9.4					
goats	471					
rabbits	11					
ducks	7.4					
geese	13.5					
sheep	37					

TABLE C-14

WEIGHTS ASSIGNED TO LAND USE SYSTEMS IN THE 2-5 KM ZONE*

LAND USE SYSTEM	WEIGHTS (kg/ha)						
	LF-4N	PI-13N	PI-1N	LF-3C	LF-9C	PI-27E	LF-1E
Row crops/continuous row crops	3449	3586	3653	3909	4758	N/A**	4648
Corn wheat/corn	3998	4159	3872	4447	4969	4761	4608
Mixed	4468	4919	4522	5519	5082	4936	5185
Hay-grain/hay system	4539	5248	4577	5168	4807	5196	5889
Hay/pasture system	4619	4106	4130	5330	5529	5346	6364
Grazing/grazing	4288	5405	4869	2976	5040	N/A	N/A
Cereal grain/grain system	4290	3955	3736	3243	3782	N/A	N/A
Orchard/orchard	12366	13649	13649	4650	12401	N/A	N/A
Vegetables and berries/ field vegetables	11964	21002	13274	11180	22496	21476	N/A
Nursery	N/A	4821	N/A	N/A	N/A	N/A	N/A
Sod	N/A	N/A	N/A	N/A	N/A	3661	N/A
Vineland	N/A	N/A	N/A	N/A	N/A	N/A	6278

* A weighted average (kg/ha) of crops grown within each land use system was determined by assigning the weights in Table C-13 to the relative crop type and proportion outlined in Appendix B, Table B-10.

** N/A - land use system does not occur in the zone.

3.7 RESULTS

The final step in the analysis entailed combining the grid cell value data with concentration estimates to generate exposure indices. These indices measure relative exposure. They do not estimate economic damages per se to crops or livestock/poultry. They are designed to enable comparisons among siting options on the basis of relative risk of economic damage. The algorithm used to develop the exposure index was:

(total crop or livestock value/cell) x
(mean concentration/cell)

Crop and livestock value data are not added together in this calculation even though both represent annual revenue. To do so would be double counting since local livestock populations would undoubtably be fed locally grown crops. These feed crops would obviously not be sold. While this problem of double counting could have been overcome, it was decided to keep the two sets of values separate in order to be able to differentiate between crop and livestock exposure across sites.

Four sets of concentration data were employed:

i) Annual means from incinerator stack emissions
ii) Seasonal means from incinerator stack emissions
iii) Annual means from fugitive emissions
iv) Seasonal means from fugitive emissions

Values for crops and livestock for each grid cell were forwarded to ORF. The individual cell rates are on file at Ecologistics Limited. The estimated values are summarized for each zone in Tables C-15 and C-16.

The exposure indices for each site prepared by the O.R.F. are shown in Tables C-17 and C-18. Included on both talbes are the results for the base case and for existing conditions (1984). The latter was used in the

TABLE C-15

TOTAL VALUE ($000'S) OF CROPS PER STUDY ZONE PER SITE

	SITE							
ZONE	LF-3C	LF-9C	LF-1E	PI-27E	LF-2N	PI-1N	LF-4N	PI-13N
0-2 km	278	372	240	145	318	490	350	872
2-5 km	1,872	1,947	1,173	1,023	1,417	2,326	3,782	5,149
5-20 km	35,516	47,843	23,596	28,564	*	20,764	21,788	16,470

* Site LF-2N was never considered as a possible location for an incinerator. The value of crops for the 5-20 km zone (stack emissions) was not determined.

TABLE C-16

TOTAL VALUE ($000'S) OF LIVESTOCK PER STUDY ZONE PER SITE

	SITE							
ZONE	LF-3C	LF-9C	LF-1E	PI-27E	LF-2N	PI-1N	LF-4N	PI-13N
0-2 km	1,103	5,602	307	238	336	193	507	691
2-5 km	6,504	9,212	4,156	1,773	204	3,156	2,814	3,686
5-20 km	70,407	59,689	13,289	12,765	*	16,756	18,197	15,784

* Site LF-2N was never considered as a possible location for an incinerator. The value of livestock for the 5-20 km zone (stack emissions) was not determined.

TABLE C-17

CROP EXPOSURE INDEX

ALL FIELD CROPS

DOSAGE*

	1984		2000	
SITE	STACK	FUGITIVE	STACK	FUGITIVE
LF-4N	N/A	1965097	N/A	1960640
PI-1N	133889	1629926	132927	1613017
PI-13N	169093	3905538	169093	3905538
LF-9C	362388	734448	362315	733534
LF-3C	260123	574294	259975	572924
LF-1E	141503	402416	139455	373320
PI-27E	172871	274787	171312	204383

SENSITIVE CROPS

DOSAGE

	1984		2000	
SITE	STACK	FUGITIVE	STACK	FUGITIVE
LF-4N	N/A	188990	N/A	188990
PI-1N	35823	214264	35823	214264
PI-13N	38631	465445	38631	465445
LF-9C	230278	8750	230278	8750
LF-3C	104053	5536	104053	5536
LF-1E	63866	12957	63866	12957
PI-27E	56745	376	56745	0

* Dosage represents the sum (over all cells) of concentration.

Source: Provided by the Ontario Research Foundation, 1985.

TABLE C-18

LIVESTOCK/POULTRY EXPOSURE INDEX

	DOSAGE			
	1984		2000	
SITE	STACK	FUGITIVE	STACK	FUGITIVE
LF-4N	N/A	1672657	N/A	1672657
PI-1N	119374	1190501	119374	1190501
PI-13N	123487	3935502	123487	3935502
LF-9C	478207	4438129	476104	4414229
LF-3C	628530	1869622	628530	1869622
LF-1E	149357	1416941	147481	1393429
PI-27E	109263	436202	106604	290113

* Dosage represents the sum (over all cells) of concentration times livestock dollar value.

Source: Ontario Research Foundation, 1985.

sensitivity analysis (Chapter 6). Table C-17 presents the results for both sensitive crops and the full range of crops grown in the air dispersion zones. The latter was also used in the sensitivity analysis.

4.0 GROSS FARM REVENUE

4.1 INTRODUCTION

Gross farm revenue is a summary measure of the agricultural productivity in an area. Two revenue figures were used as indicators in the comparative evaluation - one for on-site farms and one for regional agricultural activity. Section 4.2 presents the methods used to estimate on-site gross revenue figures and Section 4.3 the methodology for estimating regional gross revenue figures.

4.2 ON-SITE GROSS FARM REVENUE

Total on-site gross farm revenue includes revenues from all on-site properties with, and without headquarters.

Revenue figures for 1983 reported by respondents on the site and site vicinity questionnaires (Appendix B, Section 2.2) were given first priority in determining on-site farm revenues. Estimates were made when revenue information was not volunteered by the respondent or when revenue data was required for only a portion of a farm operation, i.e. the operation used both on and off-site lands.

When revenue figures were not reported, cropping area and livestock population data from the questionnaires provided the basis for revenue calculations. These were multiplied by crop and livestock value factors (from Tables C-7, C-11 and C-12) to estimate total annual income. Crop values measured average annual revenue per hectare of each crop grown while livestock values measured annual revenue for livestock product sales associated with each animal housed in an operation at one time. In the case of livestock operations, feed requirements were deducted from the total annual production of crops. Thus, crop values were applied only to those crops in excess of on-farm feed requirements.

In the case of farms with on-site headquarters with on and off-site land, crop revenues from off-site properties were subtracted from total farm revenues. Where headquarters were located off-site crop revenues were estimated for the on-site properties. In both these cases, crop revenues were estimated by multiplying the area of cropland by an average annual crop revenue value (dollars per hectare) (O.M.A.F., Publication 20). This average value, reflecting the full mix of crops found in the site and site-vicinity study area, was a weighted average of average annual values for specific crops. The weights used were the proportion of cropland in the study area planted to each crop.

Total on-site gross farm revenue was estimated as the sum of total revenues for farms with on-site headquarters plus total estimated crop revenues from on-site land used by off-site farms minus total estimated crop revenues from off-site land used by on-site farms.

4.3 REGIONAL GROSS FARM REVENUE

Gross farm revenues were estimated for the regional agricultural community zone. Data for the analysis were gross farm sales reported in the 1981 Census of Agriculture, Statistics Canada on an E.A. basis.

For the purposes of analysis the sales were assumed to be evenly distributed within each E.A. The boundaries of E.A.'s around each site were mapped at a scale of 1:63,360. A 5 km circle, centred on each site was drawn on each map. The total sales for an E.A. would be recorded only if the E.A. was situated entirely within the 5 km circle. If only part of the E.A. was within the 5 km area, the gross farm sales would be estimated as follows:

(gross farm sales) x (percent of E.A. within the 5 km circle)

5.0 AGRICULTURAL VEHICLE IMPACT INDEX

5.1 INTRODUCTION

The agricultural vehicle impact index, as a sub-indicator, is used to measure the potential conflict between O.W.M.C.-related traffic and farm machinery movements along the roads in the comparative evaluation of siting options.

The index developed by M.M. Dillon Transportation is as follows:

$$\text{agricultural vehicle impact index} = \text{change in traffic volume} \times \text{access road link length} \times \text{number of machinery movements}$$

where,

$$\text{change in traffic volume} = \frac{\text{forecasted traffic volumes + O.W.M.C. volumes (at capacity)}}{\text{forecasted traffic volumes (at capacity)}}$$

The Dillon Transportation report (1985b) contains the methodology for determining the `change in traffic volumes´ and the `access road link length.´ The agricultural consultants provided M.M. Dillon with the total number of farm equipment movements along each access road link. Outlined in this section are the data compilation procedures.

5.2 DATA COMPILATION

The number of machinery movements was determined using information gathered via the access road questionnaire. Question number seven (Figures B-9 and B-10) asked the respondent to identify the distance travelled per round trip with each machine or machine complement, as well as the number of times each machine would travel on the road. Since the orientation of these questions was toward a `round trip', the number of machinery movements cited by the respondent was always doubled in order to arrive at the total number of times that any one machine was actually on the road.

Any one operator living along an access road will use one or more links of the entire access route length. The links used will depend on where the machinery is stored and the property to which the machinery is to be transferred. Figure C-4 illustrates the relationship between access links and access roads.

For the purpose of determining the number of trips along each link, an operator who transfers equipment from property #1 to property #2 is said to use three links: ED, DC and CB. Even though only a part of a link is travelled, his/her machinery movements are counted on that link because he/she may be exposed to O.W.M.C. traffic while on that link. Machinery movements are counted twice: once for going to another property and again for the return trip.

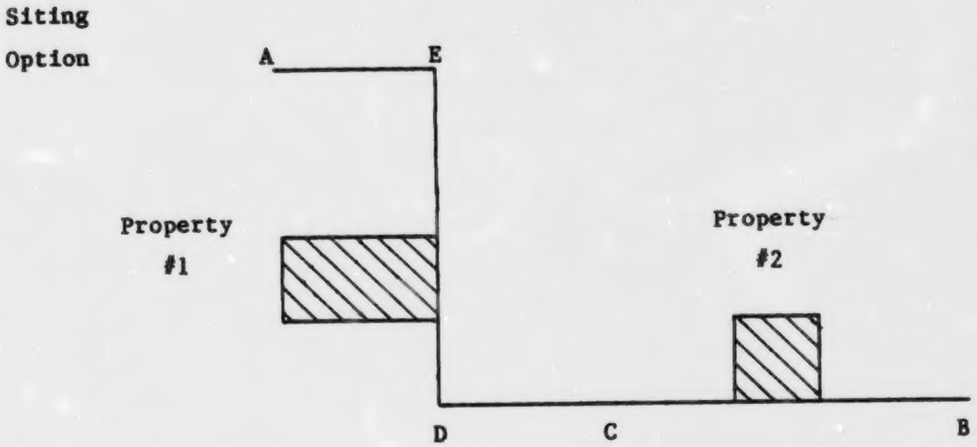
Consideration was also given to those properties zoned industrial, commercial or residential by the year 2000. A zero value was assigned to the number of farm machinery trips originating from or going to such properties.

5.3 RESULTS

The final Agricultural Vehicle Impact Indexes for each access road link, provided by M.M. Dillon are shown in Table C-19.

FIGURE C-4

SCHEMATIC FOR DETERMING THE NUMBER OF TRIPS ALONG EACH ACCESS ROAD LINK


Siting Option
A
E
Property #1
Property #2
D
C
B

AB = access route

AE = access road links

ED = access road links

DC = access road links

CB = access road links

TABLE C-19

ACCESS ROAD AGRICULTURAL VEHICLE IMPACT DATA FOR SITING OPTION LF-3C

LINK DESCRIPTION	NUMBER OF TRIPS BY FARM MACHINERY	AGRICULTURAL VEHICLE IMPACT INDEX
A. Highway 20		
1. R.R. 24 to LF-9C	3718	20302.789
2. LF-9C to R.R. 65/R.R. 27	4768	19650.187
B. Vineland Townline Road (R.R. 24)		
1. QEW to R.R. 81	2032	7768.088
2. R.R. 81 to Moyer Rd.	40	28.149
3. Moyer Rd. to R.R. 73	250	276.463
4. R.R. 73 to Ninth Ave.	1550	5462.597
5. Ninth Ave. to R.R. 216	846	2562.862
6. R.R. 216 to Hwy. 20	2868	11895.059
C. Regional Road 65		
1. Hwy. 20 to Krick Rd.	5154	17698.493
D. Krick Road (Local)		
1. R.R. 65 to 0.6 km south	72	123.995
2. 0.6 km south of R.R. 65 to Vaughan Rd.	804	2207.039
3. Vaughan Rd. to Elcho Rd.	2118	6759.630
4. Elcho Rd. to LF-3C	0	0.000
TOTAL IMPACT INDEX		94736.561

Source: M.M. Dillon, (1985b).

TABLE C-19 - cont'd

ACCESS ROAD AGRICULTURAL VEHICLE IMPACT DATA FOR SITING OPTION PI-13N/LF-4N

LINK DESCRIPTION	NUMBER OF TRIPS BY FARM MACHINERY	AGRICULTURAL VEHICLE IMPACT INDEX
B. Highway 25		
1. QEW to Hwy. 5	20	80.038
2. Hwy. 5 to PI-1N	1327	8497.426
3. PI-1N to Britannia Rd.	749	749.408
C. Fourth Line (R.R. 4)		
1. Hwy. 401 to Main St.	224	112.590
2. Main St. to Derry Rd.	576	1182.585
3. Derry Rd. to Britannia Rd.	1742	6049.998
D. Britannia Road		
1. Fifth Line to Fourth Line	58	83.585
2. Fourth Line to Third Line	626	916.274
3. Third Line to Hwy. 25	812	1188.521
4. Hwy. 25 to First Line E.	1401	2124.386
5. First Line E. to LF-4N	629	1519.090
F. Fifth Line (Local)		
1. Britannia Rd. to PI-13N	434	656.284
TOTAL IMPACT INDEX		23160.187

Source: M.M. Dillon, (1985b).

TABLE C-19 - cont'd

ACCESS ROAD AGRICULTURAL VEHICLE IMPACT DATA FOR SITING OPTION PI-1N/LF-4N

LINK DESCRIPTION	NUMBER OF TRIPS BY FARM MACHINERY	AGRICULTURAL VEHICLE IMPACT INDEX
B. Highway 25		
1. QEW to Hwy. 5	20	80.038
2. Hwy. 5 to PI-1N	1327	8497.426
3. PI-1N to Britannia Rd.	749	757.605
C. Fourth Line (R.R. 4)		
1. Hwy. 401 to Main St.	224	112.590
2. Main St. to Derry Rd.	576	1182.585
3. Derry Rd. to Britannia Rd.	1742	6049.998
D. Britannia Road		
2. Fourth Line to Third Line	626	931.667
3. Third Line to Hwy. 25	812	1208.488
4. Hwy. 25 to First Line E.	1401	2124.386
5. First Line E. to LF-4N	629	1519.090
E. First Line East (Local)		
1. PI-1N to Britannia Rd.	314	337.169
TOTAL IMPACT INDEX		20676.657

Source: M.M. Dillon, (1985b).

TABLE C-19 - cont'd

ACCESS ROAD AGRICULTURAL VEHICLE IMPACT DATA FOR SITING OPTION LF-9C

LINK DESCRIPTION	NUMBER OF TRIPS BY FARM MACHINERY	AGRICULTURAL VEHICLE IMPACT INDEX
A. Highway 20		
1. R.R. 24 to LF-9C	3718	20302.789
B. Vineland Towline Road (R.R. 24)		
1. QEW to R.R. 81	2032	7768.088
2. R.R. 81 to Moyer Rd.	40	28.149
3. Moyer Rd. to R.R. 73	250	276.463
4. R.R. 73 to Ninth Ave.	1550	5462.597
5. Ninth Ave. to R.R. 216	846	2562.862
6. R.R. 216 to Hwy 20	2868	11895.059
TOTAL IMPACT INDEX		48296.007

Source: M.M. Dillon, (1985b).

TABLE C-19 - cont'd

ACCESS ROAD AGRICULTURAL VEHICLE IMPACT DATA FOR SITING OPTION LF-1E

LINK DESCRIPTION	NUMBER OF TRIPS BY FARM MACHINERY	AGRICULTURAL VEHICLE IMPACT INDEX
A. Regional Road 47 (Biggar Road/ Lyon's Creek Road)		
1. QEW to R.R. 98	0	0.000
2. R.R. 98 to PI-27E	0	0.000
3. PI-27E to Crowland Rd.	34	32.788
B. Crowland Road (Local)		
1. R.R. 47 to Carl Rd.	34	116.666
C. Carl Road (Local)		
1. Crowland Rd. to Morris Rd.	0	0.000
TOTAL IMPACT INDEX		149.454

Source: M.M. Dillon, (1985b).

TABLE C-19 - cont'd

ACCESS ROAD AGRICULTURAL VEHICLE IMPACT DATA FOR SITING OPTION PI-27E/LF-1

LINK DESCRIPTION	NUMBER OF TRIPS BY FARM MACHINERY	AGRICULTURAL VEHICLE IMPACT INDEX
A. Regional Road 47 (Biggar Road/ Lyon's Creek Road)		
1. QEW to R.R. 98	0	0.000
2. R.R. 98 to PI-27E	0	0.000
3. PI-27E to Crowland Rd.	34	32.008
B. Crowland Road (Local)		
1. R.R. 47 to Carl Rd.	34	87.185
C. Carl Road (Local)		
1. Crowland Rd. to Morris Rd.	0	0.000
TOTAL IMPACT INDEX		119.193

Source: M.M. Dillon, (1985b).

6.0 ANALYSIS OF LAND OWNERSHIP

Based on the results of interviews with farmers, all properties within the agricultural study area were coded as farm or non-farm. Farm properties were further differentiated as either farmed by the operator or a tenant. Histograms were prepared for each siting option showing, for farm classes of property sizes (0-4.5, 4.5-12.5, 12.5-30.5 and greater than 30.5 ha) the proportion of farmland that is operated by an owner or tenant. The proportion of land that is not farmed is shown as a separate category. These graphs are shown in Appendix D.

Included with the graphs are summary tables showing the breakdown of the number, total size, and average size of properties within each category.

Composite maps, at a scale of 1:10,000 were prepared. The size categories were colour-coded and cross-hatching indicating tenure status was superimposed on top. These maps were reviewed with local residents at `Walk and Talk´ feedback meetings.

The final maps (Maps 17 to 24) are contained in the map portfolio which accompanies this report (Site Selection Process. Phase 4A: Selection of a Preferred Site(s) - Agriculture. Technical Data Map Portfolio).

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APPENDIX D

EXISTING ENVIRONMENT OF THE SITING OPTIONS

1.0 INTRODUCTION

Each of the six siting options has a unique agricultural character. Soil quality, crops and livestock activity, the proximity of urban development, land ownership patterns, land use planning designations and social makeup of the community influence the agricultural character. This appendix provides an expanded description of the agricultural character of these sites beyond that summarized in Chapter 6.

The six siting options are located in four regional settings - Peel and Halton Region, West Lincoln Township and the Niagara Falls area. An overview of the environment of each options is given in relation to these four regional settings.

The overview description identifies the regional location, the degree of urbanization and the nature and intensity of farming activity. Agricultural activities along the regional access roads (not including the sites) are also described. The description of the agricultural character of each site has four components: characteristics of the local agricultural community, the site vicinity, the site acquisition area and the local access roads.

The overview of the local agricultural community is based mainly on data covering the site and site vicinity that were obtained during the "Walk and Talk" survey. The area covered by these data extends to about 2 km from the site centre and includes crop and livestock data filled in for missed or refused interviews (Appendix B). These data are summarized in Table D-1. The average age of operator data was obtained from I.E.R. Data on land tenure are taken from the land fragmentation analysis that is documented in Appendix C.

Data are used from the 1981 Census of Agriculture for an area extending to 5 km from the site centre (regional community). These include the number of farms, area of improved farmland and gross farm revenues.

The vicinity section presents information about agricultural resources in the vicinity study area end along local access roads. This area extends from the site acquisition boundary to approximately 2 km from the site centre. Data describing the agricultural character of this area were also derived from "Walk and Talk" questionnaires.

The site resources component discusses, in detail, on-site soils, crops, livestock, and information about the number of farmers who live and/or farm on site. Results from the "Walk and Talk" questionnaires were used to describe on-site resources as well.

In the following discussion, attributes of siting options are sometimes presented relative to attributes of other siting options.

2.0 SITING OPTIONS LF-1E AND LF-1E/PI-27E

2.1 REGIONAL CHARACTER

Sites PI-27E and LF-1E are in the Regional Municipality of Niagara. The site areas are situated next to the City of Niagara Falls to the north and the QEW to the east. Open rural lands lie to the south and west.

Although the general area south of Niagara Falls is still largely agricultural, the encroachment of urban uses and competing land uses are evident. Consequently, few large scale farm building complexes are found. Instead, many farm buildings are small, dated and, occasionally in disrepair.

The following regional access roads pertain only to those which would service these sites: Biggar Road, Schisler Road and Montrose Road.

Four of the five farm properties along Biggar Road are cash crop. There is only one farm headquarter property which is associated with an adjacent cash crop property. Two of the four properties are farmed by the same operator, who must travel along Biggar Road to access these properties from his headquarters. The fourth cash crop operator farms one property on Biggar Road and one on Montrose Road, thus he moves his equipment along both access roads.

Site LF-1E´s southern border is Schisler Road. There are four farm properties: one cash crop and three mixed livestock. Two of these are headquarter properties. There is little use made of the road in moving farm equipment.

There are only three active farm properties abutting Montrose Road; two of these are cash crop operated by local farmers, and the third is a small mixed livestock farm. Only one property is accessible from Montrose Road. The operator travels with large size equipment periodically during the growing season.

2.2 SITING OPTION LF-1E

2.2.1 Characteristics of Local Community

Seven, or 16%, of the 37 respondents in the farm interviews classified themselves as full-time farmers. Another seven said that they also worked off the farm. Fifteen said that they were part-time farmers, 14 of which have full-time employment off the farm. Nine said they were hobby or retired farmers. Of the farm operators who responded to the "Walk and Talk" questionnaire, 65% were under the age of 55.

As a group, the respondents farmed 1775 ha, 75% of which they consider to be tillable land. This lower percentage reflects the poorer quality soil in this general area.

Within the study area, only 62% of the land is farmed. Of this, only 39% of the land is farmed by landowners, the rest by tenants. Figure D-1 shows the extensive non-farm holdings, many small land parcels and the large proportion of these which are rented. Also, the proportion of non-farm residences is high (83% of total residences).

Of the 844 ha of cropped land in the local community, the dominant crop is hay (366 ha) followed by corn (243 ha), winter wheat (147 ha), clover (40 ha), and barley (17 ha). At the time of the interviews, farmers were raising only 584 livestock animal units; this included 297 pigs and 277 beef cattle.

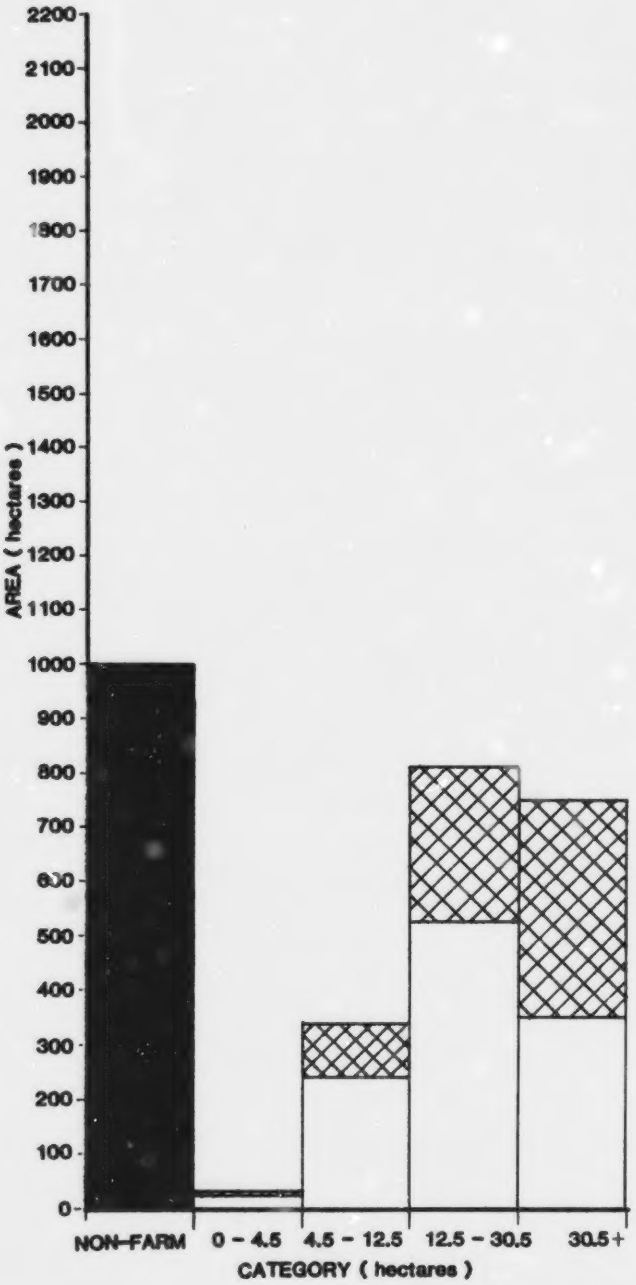
In 1981, within a 5 km radius of the site centre, the estimated gross farm sales were $36,800, the lowest value of all siting options.

FIGURE D-1

LF - 1E

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE (ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	189	1002.41	5.30
FARMED TENANT PROPERTIES	36	786.32	21.84
FARMED OWNED PROPERTIES	68	1124.79	16.54
TOTAL	293	2913.52	9.94



TENANT ▨

OWNED ☐

NON-FARM ■

Both access roads to PI-27E, Biggar Road (Regional Road 47) and Montrose Road (Regional Road 98) are regional roads. Along the short 1.5 km stretch of Biggar Road there is one farmed parcel. The parcel is operated by a local tenant in conjunciton with a property on Montrose Road, south of Biggar Road.

The land along the other access road, Montrose Road, north of Biggar Road to the site entry point is idle. There is, therefore, little farm machinery or service vehicle movements along either of these road sections.

2.2.2 Site Vicinity Characteristics

Of the 2,343 ha of land in the vicinity, 3% have residential, commercial or industrial designations; the remaining 97% have a rural/agricultural designation. The site vicinity consists mainly (65%) of Class 3 soils. About 34% are Class 1 and the remainder are Class 5. The Class 1 equivalents constitute 72% of the site vicinity area.

Within the vicinity, there are 23 farms with headquarters, 3 of these are adjacent to the site. Five operators own land adjacent to the site. Two operators would lose an average of 20 ha of sited lands; one would lose a quarter of his land base and the other a third.

The 832 ha of tillable land in the vicinity in 1984 supported a number of field crops including 287 ha of hay, 229 ha of corn, 132 ha of winter wheat, and 40 ha of clover. The vicinity farmers raise a small number of livestock - 233 beef cattle, 295 pigs and 630 chickens. Livestock densities in the adjacent vicinity are 0.26/ha and 0.25/ha in the non-adjacent vicinity.

The vicinity of the site also shows signs of the encroachment of competing land uses. Approximately one-quarter of the land is non-farm. Of the farmed land about 52% is farmed by the owner while 48% is farmed by tenants.

None of the vicinity lands are designated residential and only a small section in the northeast corner of the study area is designated industrial.

Public ownership accounts for approximately 40 ha of the vicinity area. The City of Welland owns 25 of these.

Three roads, Crowland Avenue, Carl Road and Young Road, are local access roads for site LF-1E. The eastern border of the site is Crowland Avenue. There are only four properties that are farmed, all of which are cash crop. The cash crop properties are farmed in conjunction with other properties, therefore, there is considerable equipment movement along Crowland Avenue. Several other farmers in the area use Crowland Avenue as an access road to their properties.

There are 13 properties along Carl Road between Montrose Road and the site entry point. Four of these properties are headquarters of various livestock and crop operations. Extensive use is made of Carl Road by service vehicles and farm equipment. Many farmers in the area use this road to access other properties. Site LF-1E borders Carl Road west of Crowland Avenue.

Three of the six properties abutting Young Road can also be entered from other access roads (i.e. Carl Road, Crowland Avenue). Young Road, like Carl Road is a local access road used frequently for equipment movement to properties along the road and for other properties in the area.

2.2.3 Site Characteristics

Lacustrine clays constitute the site's parent material and the heavier clay tends to appear in the better drained landscape positions. Much of the site has a "red" phase subsoil but the redness is absent in the depressional poorly drained areas.

The site has a level topography (0-2% slopes) with steeper slopes (2-15%) only along the southern extremity adjacent to a Lyon's Creek tributary. Differences in the internal soil drainage mainly explain the distribution of the soil capability between Class 2 and 3 (47% and 46% of the total site area, respectively). Topography limits potential productivity only in the south where the steeper, complex slopes occur.

Class 3 soils appear more frequently in the north where poorly drained soils predominate. This partially accounts for the large area of wooded and idle land. Class 2 soils occur more in the south where agricultural uses are prevalent.

While no tile drainage exists on-site, most fields have surface drainage channels to assist in drainage. The "red phase" found throughout the site has no influence on agricultural capability.

The LF-1E on-site properties are estimated to be 273 ha in size, 170 of which (62%) are farmland. One hundred and seven hectares were cropped in 1984. Seventy-nine hectares were in hay, 15 ha in winter wheat and the final 14 ha in corn.

There are seven farm headquarters on-site with an average size of only 27 ha. Combined, they raise 41 beef cattle, two pigs, 300 chickens, 49 horses and 185 other livestock. Two off-site operations have land on-site. The on-site properties generated an estimated $26,000 of gross farm revenue in 1984.

None of the on-site lands have been designated for either industrial or residential usages. There are no publicly owned lands on-site.

2.3 SITING OPTION LF-1E/PI-27E

2.3.1 Characteristics of Local Community

Forty-four farm interviews were completed and nine of the farmers classified themselves as "full-time" farmers with no off-farm employment. Eight called themselves full-time farmers but they work full-time off the farm as well. The remaining twenty-seven farmers called themselves part-time, hobby or retired. Of the farm operators who responded in the interviews, 64 were below the age of 55.

Combined, the respondents farm 2,960 ha of land of which 77% are considered tillable. Within the local agricultural community 59% of the land is farmed and, of this, only 27% is farmed by the owner. Figures D-1 and D-2 show that the area around these sites is dominated by non-farm land uses, especially PI-27E. Much of the farming takes place on small land parcels and most of it on a rental basis. Non-farm residences comprise 85% of the total number of residences.

Farmers in the local community were raising relatively few (1,067) livestock animal units in 1984; these included 309 pigs, 287 beef cattle and 35,930 broiler chickens. Hay (427 ha), corn (322 ha), winter wheat (178 ha) and barley (54 ha) were the most common crops.

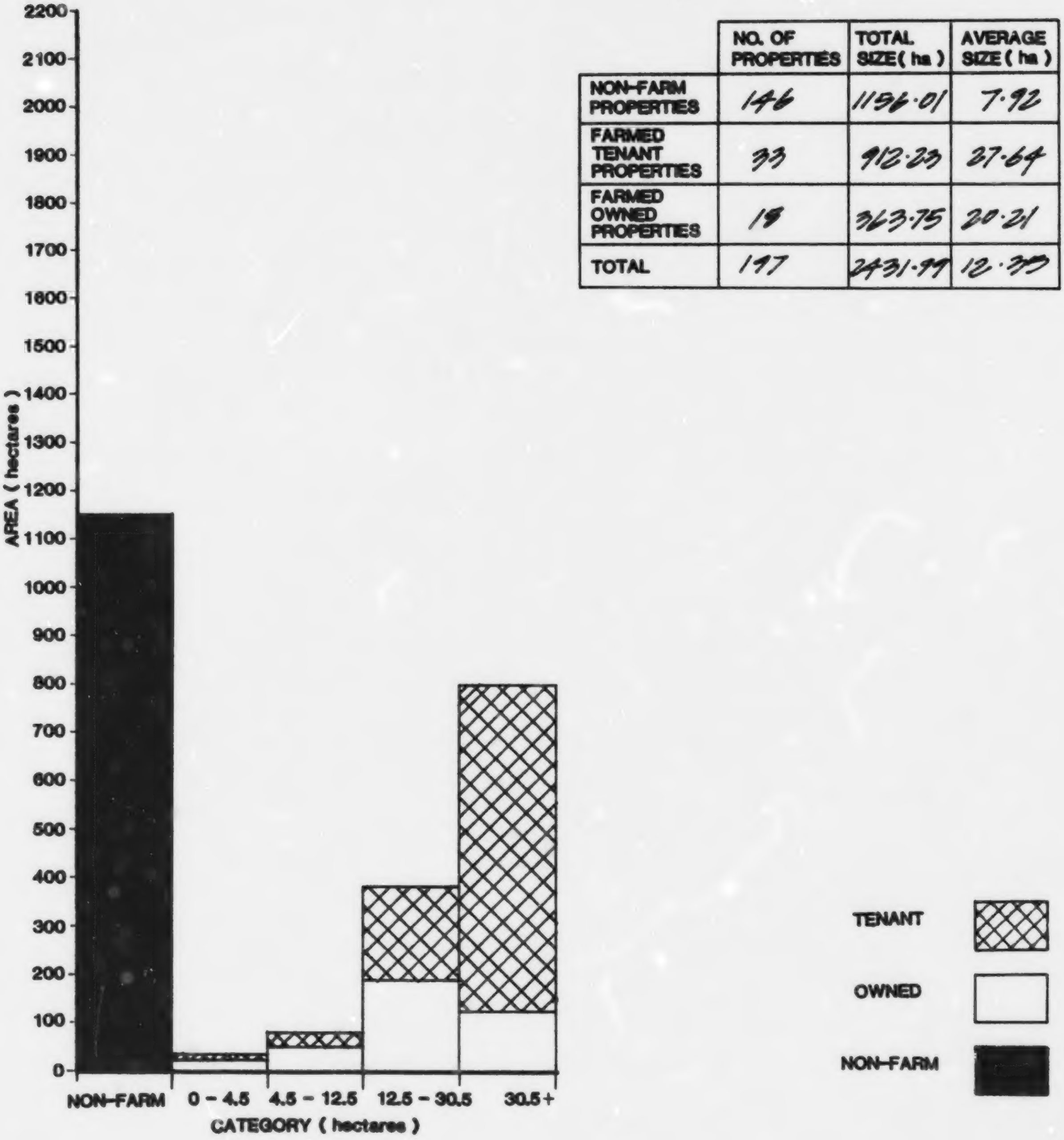
Within a 5 km radius of the site centre, in 1981, gross farm sales were $2,700,000.

FIGURE D-2

PI - 27E

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE(ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	146	1156.01	7.92
FARMED TENANT PROPERTIES	33	912.23	27.64
FARMED OWNED PROPERTIES	18	363.75	20.21
TOTAL	197	2431.99	12.35



2.3.2 Vicinity Resources

The vicinity of this siting option is dominated by Class 3 soils. Class 1 land is the next most prevalent and small pockets of Classes 5 and 7 occur.

In the case of PI-27E, 49% of its vicinity is designated residential, commercial or industrial.

Within the vicinity there are 23 farms with headquarters, 4 of which are adjacent to the sites. Seven operators own farmland adjacent to the sites. Six farms would lose an average of 29 ha of on-site land; this represents up to one-quarter of their operating land base.

Only 42% of the 2,268 ha of tillable land in the vicinity in 1984 supported field crops. These included 355 ha of hay, 264 ha of corn, 160 ha of winter wheat, 54 ha of barley and 112 ha of other crops. The farmers were raising a small number of livestock in the vicinity area, including 85 dairy cows, 232 beef cattle, 307 pigs and about 36,000 chickens.

Public ownership of site PI-27E accounts for 97 ha, the majority of which belongs to Ontario Hydro.

Access roads are covered in the LF-1E section.

2.3.3 Site Characteristics

Generally, lacustrine clay predominates on site PI-27E although silty clay to clay was found extensively in the northern part of the site and in pockets elsewhere on-site. Non-agricultural uses on the eastern site boundaries have led to extensive soil disturbance and, consequently, the areas were not rated.

Class 2 and 3 soils (45% and 40% of total site area respectively) predominate. As well Class 1 (11% of site area) and small amounts of Class 4 (0.7%) and 5 (0.6%) occur. In the south, undesirable soil structure and excess soil water in depressional areas limit soil productivity. In the north steeper and more complex slopes become limiting factors on soil productivity.

Class 3 soils are more common in the central area where the railway seems to have altered the normal drainage pattern. Brush and woodlot cover most of this poorly drained area. The south area and the western boundary are the most intensely cropped areas.

Soil conditions on Site LF-1E were discussed in the previous section.

One hundred and thirty-four hectares of the 323 ha site acquisition are considered tillable. Of the tillable land, 156 ha (48%) are cropped and include 58 ha of corn, 72 ha of hay and 18 ha of winter wheat. At the time of the interviews, there were 55 beef cattle, and 100 chickens and some other livestock reported on-site. The on-site properties generated an estimated $38,100 of gross farm revenue in 1984.

There are six farm operators with headquarters on-site. All six use owned land, but the average farm size is 31 ha. Three of these are smaller than 15 ha. Six off-site respondents farm the remaining on-site properties as part of their operations.

The entire site has been designated for industrial use. Ontario Hydro owns a right-of-way running diagonally through the site which equals approximately 5 ha of public ownership of on-site land.

3.0 SITING OPTIONS LF-9C AND LF-3C

3.1 REGIONAL CHARACTER

Sites LF-9C and LF-3C are situated in the Township of West Lincoln in the Regional Municipality of Niagara. A stable agricultural industry characterizes the West Lincoln community. The major portion (over 80%) of lands farmed are owned by the farmer. This high level of ownership also indicates the lack of competition for land between residential, commercial, industrial or land speculation interests and agriculture.

Agriculture in this area emphasizes livestock and field crops rather than cash crops since many of the heavy clay soils, without forages in the crop rotation, would tend to compact and degrade under conventional cash cropping systems. As well, livestock provide manure which can be used to increase organic matter in the soil and improve soil tilth.

There are four regional access roads serving sites LF-9C and LF-3C. The sites share two of the four regional access roads - Vineland Road and Highway 20. Regional Road 27 and Regional Road 65 serve only site LF-3C.

Vineland Road is one of the two major regional access roads for LF-9C and LF-3C. Thirty of the 50 farm properties along Vineland Road produce fruit - specifically grapes, peaches, cherries and other mixed fruits. The remaining 20 properties are divided between cash crop, dairy, hog, horse and mixed livestock and crop operations.

The majority of fruit farms are along the north half of Vineland Road. Most of these farms have headquarters and make little use of Vineland Road for equipment movements.

The southern section has a wider diversity of farm types, as well, there are a few non-local tenants who travel the access road with equipment. Approximately half of the farms are owner/operators with headquarters on the properties. The other half are cash crop operations, worked by local tenants who use Vineland Road periodically throughout the growing season.

The regional access road section of Highway 20 for LF-9C runs from Vineland Road west to Schram Road. The 5 km stretch is made up of intensive farm operations. There are seventeen properties, of which two are dairy, two are turkey, one is a tree farm, seven are cash crop operations and five are mixed crop and livestock farms. There is one custom operator who farms three properties. Due to the high density of farms, Highway 20 is used extensively to move farm equipment. The turkey and dairy operations are largely self-contained with less need for equipment movement on the roads. However, these operations have many service vehicle stops.

A further stretch (4.25 km) of Highway 20 leads to site LF-3C. Along this stretch there are 27 farming properties. The characteristics of this western section are similar to those of the eastern section. Along this stretch there are seven poultry, four dairy, eight cash crop, two beef feedlots and six mixed crop and livestock operations. The poultry, beef and dairy operations have a large number of service vehicle stops per year. There are two large custom operators who, between them, farm seven properties along Highway 20. As each of these operators farms several properties, and the other farmers along the road use it for equipment movement, there is much farm machinery travel on the access road at most times of the year.

Regional Road 27 could serve as a partial route to site LF-3C. Local owners or tenants farm the majority of the properties. Only four of the

10 farm properties are farm headquarters. Four of the ten properties are cash crop operations. There is one dairy farm, one beef feedlot and one poultry operation as well.

Regional Road 65 is another regional access road for site LF-3C. Nine of the fifteen properties along the road have farm headquarters. Two farmers, each of whom farm two properties, use the road extensively for equipment movement. There are four dairy operations, one large poultry operation that spans three properties, three cash crop operations and five mixed livestock and crop operations. Service vehicles (milk trucks, oil trucks, etc.) make frequent stops at the dairy and poultry operations.

3.2 SITING OPTION LF-9C

3.2.1 Characteristics of the Local Community

Twenty-five of the 42 respondents classified themselves as full-time farmers with no off-farm employment. Seven of the 34 were employed full-time off the farm. Five of the remaining 10 part-time farmers were also employed full-time off the farm. Of the Walk and Talk respondents, 75% of the farm operators were below the age of 55 at the time of the interview.

Together, the respondents farm 2,773 ha and of this, 84% is tillabe. Farmland represents 94% of the local community area. Of this, 76% is farmed by the landowner. This is the highest level of owner-operated farmland among the siting options.

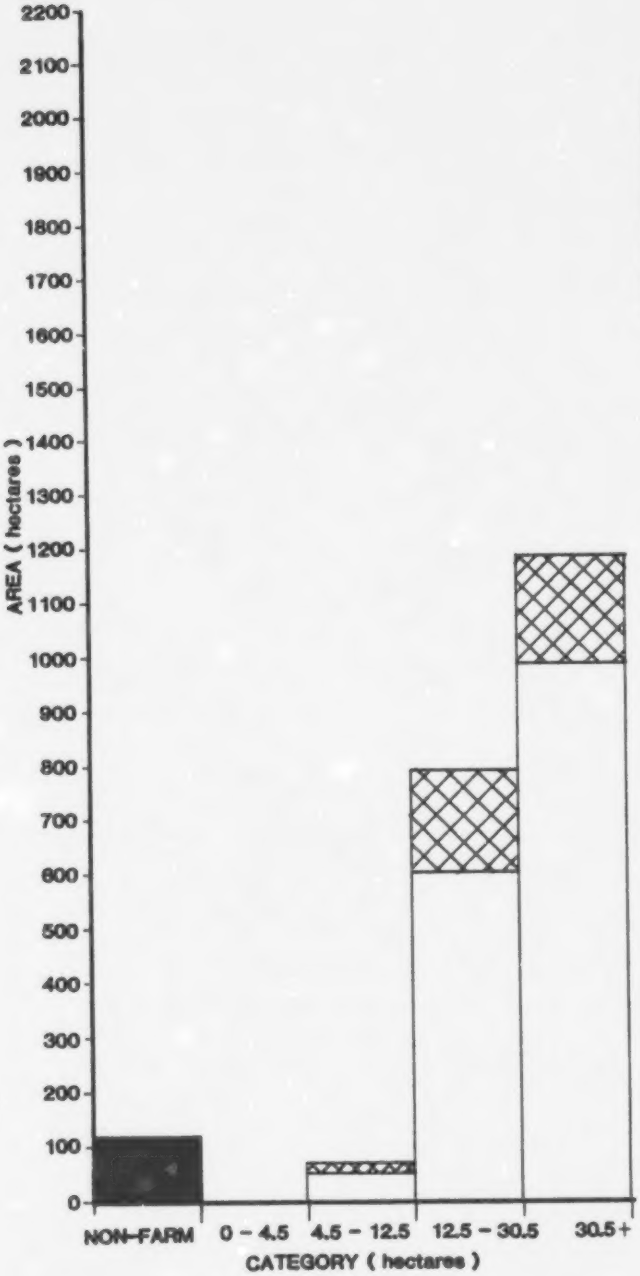
Figure D-3 indicates less non-farm landownership than LF-3C, but the parcel sizes and level of land rental are approximately the same as

FIGURE D-3

LF - 9C

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE (ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	40	126.73	3.17
FARMED TENANT PROPERTIES	16	390.68	24.42
FARMED OWNED PROPERTIES	58	1642.94	28.33
TOTAL	114	2160.35	18.95



LF-3C. At 42%, non-farm residences as a proportion of all residences is the lowest of all siting options.

Farmers within the local community raise 3,462 livestock units, again, the highest of all siting options. Beef cattle (1,551), dairy cattle (476), pigs (957) and chickens (109,130) are the main livestock types.

Cropped land included 509 ha of hay, 360 ha of corn, 94 ha of soybeans and 251 ha of small grains. In 1981, within a 5 km radius of the site centre, $8,616,000 of gross farm sales were generated.

3.2.2 Site Vicinity Characteristics

Within the site vicinity, soil capability is dominated by Class 2 (33%) and Class 3 (59%). Small pockets of Classes 1, 4 and 5 are as present. The Class 1 equivalents constitute 69% of the vicinity area.

The 1,152 ha of cropped land in the vicinity in 1984 consisted of 455 ha of hay, 357 ha of corn, 126 ha of winter wheat, 94 ha of soybeans, and 118 ha of other grains.

Livestock numbers in the vicinity were high: 1,539 beef cattle, 432 dairy cattle, 957 pigs and 109,074 chickens. Livestock densities were 1.14 in the adjacent vicinity and 2.44 in the non-adjacent vicinity.

The site vicinity contains 29 farms with headquarters, six of which are located adjacent to the site. Eight farm operators own land adjacent to the site, while one farm would lose 20 ha of on-site land. It would represent 16% of that farm's land base.

A small section of land at the corner of Bismark Road, Highway 20 and Regional Road 27 and another section along Regional Road 27 just north of the Welland River have been designated for residential use. No land has been designated industrial. In the vicinity study area only one small property (one hectare in size) is owned by a public agency. All other properties are privately held.

Schram Road is a short local road, which forms the eastern boundary of site LF-9C. There are only three farms on Schram Road between Highway 20 and the access road entry point. Two farms are dairy operations. The other two properties are farmed by the same local owner-operator, one as a cash crop and the second as part of a dairy operation.

Schram Road is travelled extensively by local farmers to get to Highway 20 and other properties associated with their farm operation.

3.2.3 On-Site Resources

Lacustrine clay predominates on site LF-9C. A silt veneer exists on the woodlot soils and has been largely eroded on the cultivated area accounting for this site's silty clay surface texture. Many poorly drained depressions have accumulated organic matter and occasionally fine textured colluvium. Farms outside the site acquisition area have improved conditions in depressions similar to these through a combination of surface and tile drainage.

While simple slopes (2-5%) somewhat limit soil productivity the main constraint is soil drainage and that constraint accounts for the distribution of soils between Class 2 (56% of total site area) and Class 3 (40% of total site area). There are 90 ha of Class 1 equivalent soils on-site. Nineteen hectares of land have been tile drained. On the south part of the site an intricate network of natural surface drains provides natural drainage outlets.

Of the 135 ha on-site, an estimated 64 ha were in crops in 1984—54 ha of hay, 7 ha of barley and 3 ha of corn. One property, 40 ha in size, although tillable, was idle in 1984.

Two farm respondents reside and have their farm headquarters located on-site. One of the two is a full-time farmer with no off-farm employment while the other is a retired farmer. The two operations, combined, have 44 dairy cattle, 12 beef cattle, 56 chickens and one horse. The on-site properties generated an estimated $53,000 of gross farm revenue in 1984.

No on-site lands have been zoned for either industrial or residential uses. All on-site lands are privately held.

3.3 SITING OPTION LF-3C

3.3.1 Characteristics of Local Community

Twenty-five respondents (52%) of the 48 farmers interviewed classified themselves as full-time farmers with no off-farm employment. Four farmers classified themselves as full-time, but also had off-farm employment. The remaining 19 respondents classified themselves as part-time farmers and 13 of these are employed full-time off the farm. At the time of the "Walk and Talk" interviews, 75% of the farm operators who responded were below the age of 55.

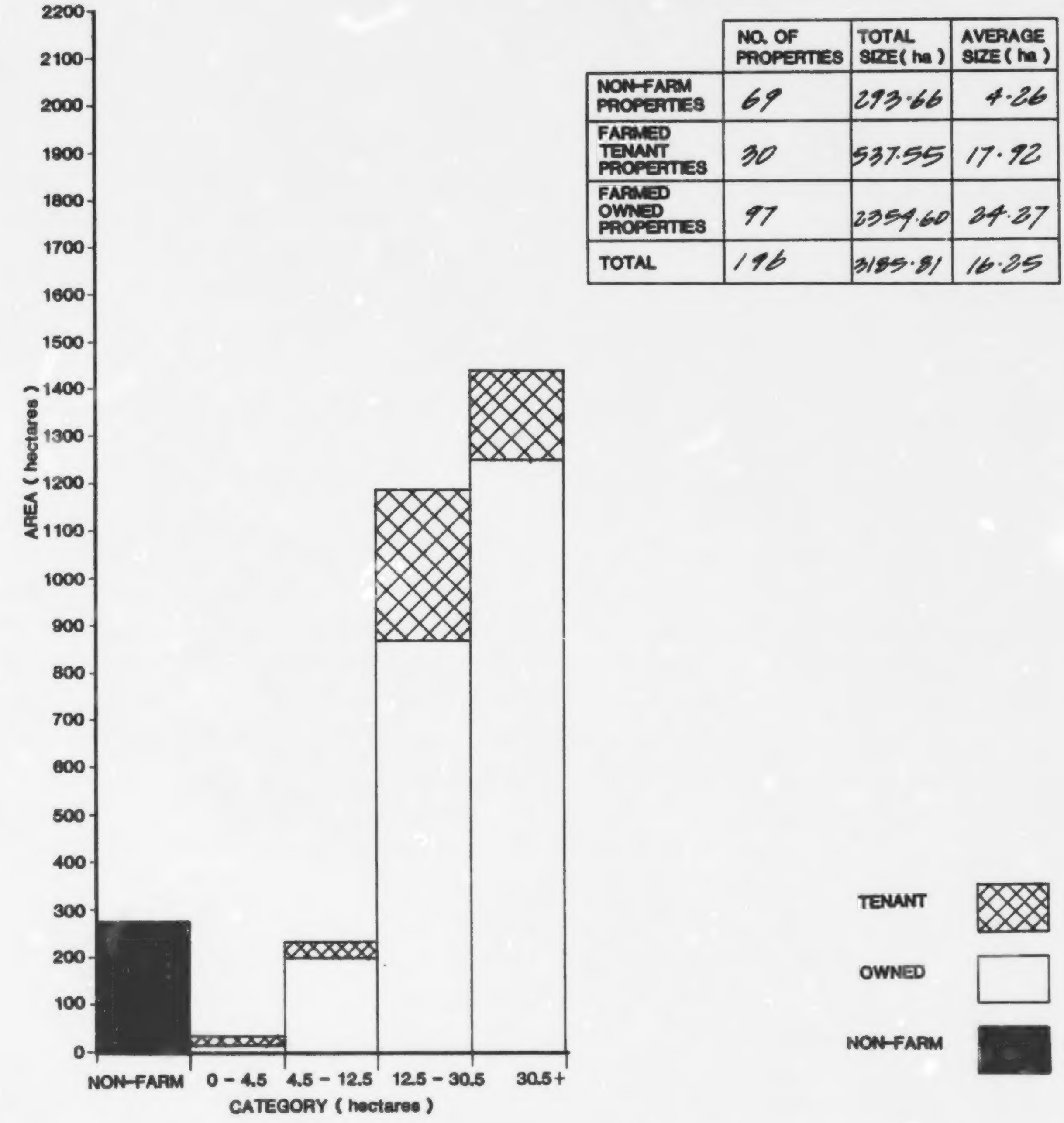
Altogether the respondents farm 3,144 ha of which approximately 80% is tillable. Within the study area, 91% of the land is farmed and, of this, 74% is farmed by the owner. Figure D-4 shows that most of the land is in large parcels, although there are many of an intermediate size (12.5 - 30.0 ha). The majority of both size groups are farmed by owners. A significant block of land is classified as non-farm. Much of this is due

FIGURE D-4

LF - 3C

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE (ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	69	293.66	4.26
FARMED TENANT PROPERTIES	30	537.55	17.92
FARMED OWNED PROPERTIES	97	2359.60	24.37
TOTAL	196	3185.81	16.25



to a large conservation area on the Welland River and to a large rural subdivision in the southwest corner of the study area. The latter helps to explain the relatively high proportion (64%) of rural non-farm residences in the local community.

Livestock-rearing dominates agriculture within the local community. In the local community, farmers were raising 1,826 units of livestock in 1984. Site LF-3C has the largest number of dairy cattle among the alternate sites - a total of 1,002 head. The main crops in the local community are hay (427 ha), corn (322 ha) and winter wheat (178 ha). Cropped lands account for 35% of the farmed land, the balance being pasture, woodlot, idle land and farm buildings.

In 1981, within a 5 km radius of the site centre, the gross farm sales were $6,850,000.

3.3.2 Site Vicinity Characteristics

The vicinity soils are mainly Class 2 (57%) and Class 3 (31%). Minor pockets of Classes 1, 4 and 5 also occur. The Class 1 equivalent area of these soils constitutes 70% of the site vicinity area.

Within the vicinity there are 36 farms with headquarters, 5 of which are situated adjacent to the site. There are 10 farm operators with owned land adjacent to the site. Three operators would lose an average of 47 ha of on-site farmland. This could represent up to one-third of the operators' land base.

The tillable portion of the vicinity in 1984 supported a number of field crops, including 793 ha of hay, 332 ha of corn, 198 ha of grains, and 5 ha of fruit trees. Many livestock are raised in the vicinity area—961 dairy cows, 174 beef cattle, 1,557 pigs, 19 horses and about 22,500 poultry. Livestock densities are 0.32/ha in the adjacent vicinity and 1.09/ha in the non-adjacent vicinity.

No vicinity lands have been zoned for either industrial or residential uses. About 70 ha of vicinity land are publicly owned. The Niagara Peninsula Conservation Authority has two properties (57 ha) in the southeast corner of the study area.

Two local access roads, Krick Road and Elcho Road, could serve site LF-3C. One operator owns and works seven of the 12 farm properties along Krick Road. Three farmers work land on Regional Road 65 as well as on Krick Road. Two others are headquarter properties and a sixth is a property associated with a large dairy/beef operation headquartered on Vaughan Road. The majority of properties are associated with dairy operations. The one operation walks its dairy cattle to various properties along Krick Road. Since there are no headquarter complexes facing Krick Road, there are very few service vehicle stops; however, many service vehicles must turn off Krick Road to reach headquarters on Vaughan Road.

Fifteen of the 21 properties along Elcho Road contain farm headquarters and two of the farmers each farm two other properties. These operators and other local farmers use Elcho Road extensively. Beef, cow calf, dairy, hog, mixed livestock, cash crops and mixed crop operations are located along Elcho Road.

3.3.3 Site Characteristics

The lacustrine soil materials on site LF-3C vary from silty clay to heavy clay. A silt cap overlies the whole site. Soil capability classes vary from Class 1 to Class 5 but Class 2 (37% of site area) and Class 3 (48% of site area) predominate. Internal soil drainage and topographical variations account for the different soil capabilities. The site contains 135 ha of Class 1 equivalent soils.

A higher silt content in the upper 10 cm probably gives site LF-3C better crop yields, more uniformity and allows for dryer springtime soil conditions than the soils on LF-9C.

Approximately 57 ha of land were found to be tile drained. In addition, random tile drains have been installed along several surface drainage depressions. Of all the sites, LF-3C contains the most tile-drained land.

The LF-3C on-site properties cover 206 ha and are all classified as farmland. Of the farmland, 145 ha were cropped, in 1984; this included 56 ha of winter wheat, 42 ha of hay, 25 ha of corn, 13 ha of oats and 9 ha of soybeans.

There are two farm headquarters on-site. Together they have 41 dairy cattle. Three off-site operations would be affected by the loss of on-site land. On-site lands account for 33% of one operation's land base 18% for the other. The on-site properties generated an estimated $156,200 of gross farm revenue in 1984.

Site LF-3C is used almost exclusively for agriculture. There is only one small (2 ha) non-farm property. Of the remaining area, 37% is tenant farmed and 63% is farmed by the person who owns the property. None of the on-site lands are zoned residential or industrial. There are no publicly owned lands on-site.

4.0 SITING OPTIONS LF-4N/PI-1N, LF-4N/PI-13N

4.1 REGIONAL CHARACTER

These two siting options are located in the Regional Municipality of Halton. Urban development exists to the north in Milton, to the east in Mississauga and to the south in Oakville. The lands between Milton and Oakville are largely rural with only a few scattered hamlets.

While present land uses are predominately agricultural, signs of urbanization are present in this rural area. In comparison with agricultural areas more remote from urban influences, there are few well kept farm building complexes housing livestock, equipment or feed. Much of the farmed land is held by absentee owners - most of the farmed land is operated on a rental basis. There is also a large, rural non-farm population living on small lots and hobby farms severed from larger farm parcels. There is evidence that agricultural productivity in Halton Region lags behind that of counties with comparable land quality and climatic conditions (van Vuuren, 1983).

Four regional access roads would serve these candidate sites - Trafalgar Road, Britannia Road and Bronte Road and Fourth Line (401 to Derry Road). There are three main types of farming along Trafalgar Road - horse farms, nurseries and cash crop operations. All three types of operations make extensive use of the road with various types of equipment, service vehicles and customer stops. Trafalgar Road has the highest number of customer stops of the three access roads, mainly because of a large (horse) riding school. Eight of the 18 farm properties on this road are owner-operated; there are also several large cash-crop operations on rented land.

Britannia Road is a major regional access road used by many local farmers. Sixteen of the 30 properties have farm headquarters. These farmers often farm other properties along Britannia Road and thus make frequent use of the road to move farm equipment. There is a mix of dairy, beef, cash crop, nursery, market garden and horse farms. This mix means service vehicles (milk trucks, oil delivery trucks, etc.) and customers (to buy produce, horse-boarders, etc.) make frequent stops on the road. Brittania Road also is heavily used as an east-west link for major north-south roads.

On Bronte Road, local tenant farmers farm much of the land. Three farmers farm 6 of the 20 properties. One runs a beef operation, one a mixed crop and the other a cash crop operation. A specialty crop (elderberries), a small nursery and further cash crop operations make up the remaining 8 properties. There are only eight headquarters along Bronte Road. One operator, who farms a large number of properties along the northern half of the road, makes extensive use of Bronte Road to move farm equipment.

Fourth Line Road has 12 farmed properties. There is one large horse farm, one dairy and two mixed crop and livestock operations. The remaining eight parcels are tenant cash cropped except one property which is idle.

4.2 SITING OPTION LF-4N/PI-1N

4.2.1 Characteristics of Local Community

Twenty-three of the 41 farmers (56%) classified themselves as full-time farmers with no off-farm employment. Nine of them said they were full-time farmers, but have some degree of off-farm employment. Of those farm operators who responded to the questionnaire, 62% were under the age of 55.

As a group, they farm 7,413 ha of which 88% is considered tillable land. Within the study area, 89% of the land is farmed and, of the farmed land, 32% is owned. Farmers rent the remaining 68% of the farmed land.

Figures D-5 and D-6 show that most of the land is in large parcels but that many smaller parcels have been created for residential and hobby farm purposes. These sites have more small parcels that does PI-13N. A moderately high proportion of the residences (67%) are non-farm residences.

Corn (700 ha) and hay (591 ha) account for 55% of the 2,358 ha of total cropped land. Soybeans (259 ha), winter wheat (323 ha), oats (180 ha) and mixed grain (123 ha) make up the majority of the remaining cropped land. Farmers in the local community were raising 1,338 livestock animal units in 1984.

Within 5 km of the site centres in 1981, the estimated gross farm sales were at a moderate level of $6,370,600.

4.2.2 Site Vicinity Characteristics

The site vicinity consists largely of agricultural land. Only 3% is used for residential, commercial or industrial uses. Most of the agricultural land is in soil capability Class 1 (70+%). The balance of the land is mainly Class 3 with small pockets of other classes. The Class 1 equivalents constitute 87% of the site vicinity area.

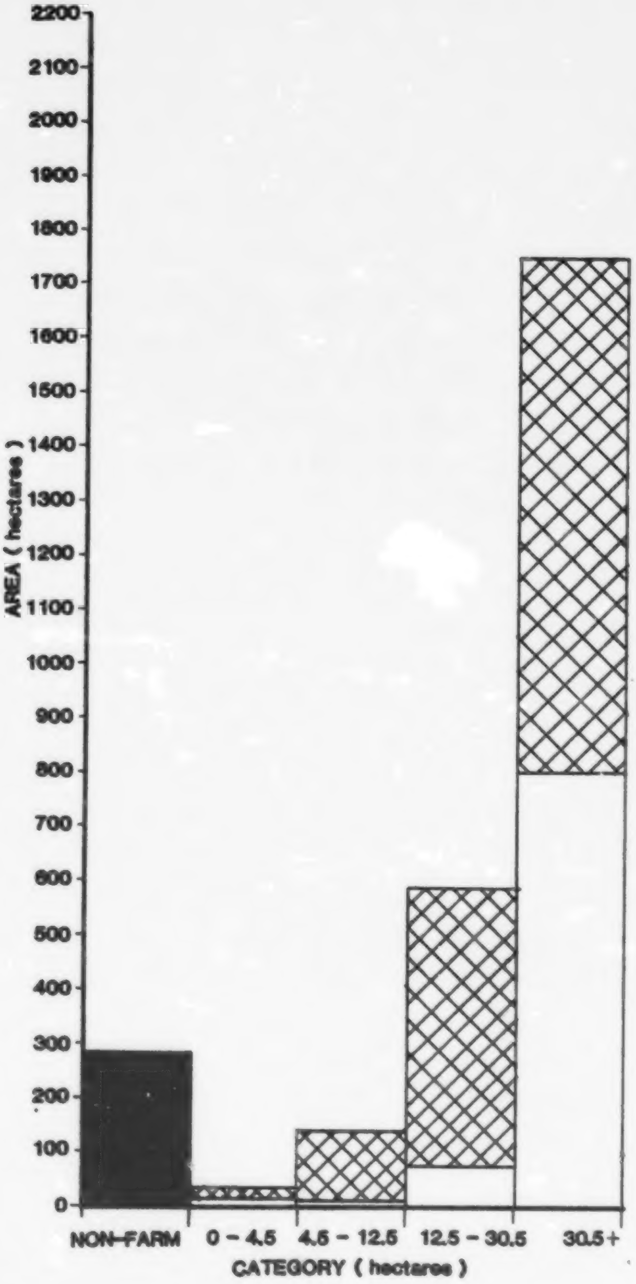
Within the vicinity there are 21 farms with headquarters, 5 of these are adjacent to the sites. Eight farm operators own farmland adjacent to the sites. There are 5 farms which would lose an average of 50 ha of

FIGURE D-5

LF - 4N

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE(ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	83	317·26	3·82
FARMED TENANT PROPERTIES	72	1611·80	22·39
FARMED OWNED PROPERTIES	25	898·11	35·92
TOTAL	180	2827·17	15·71



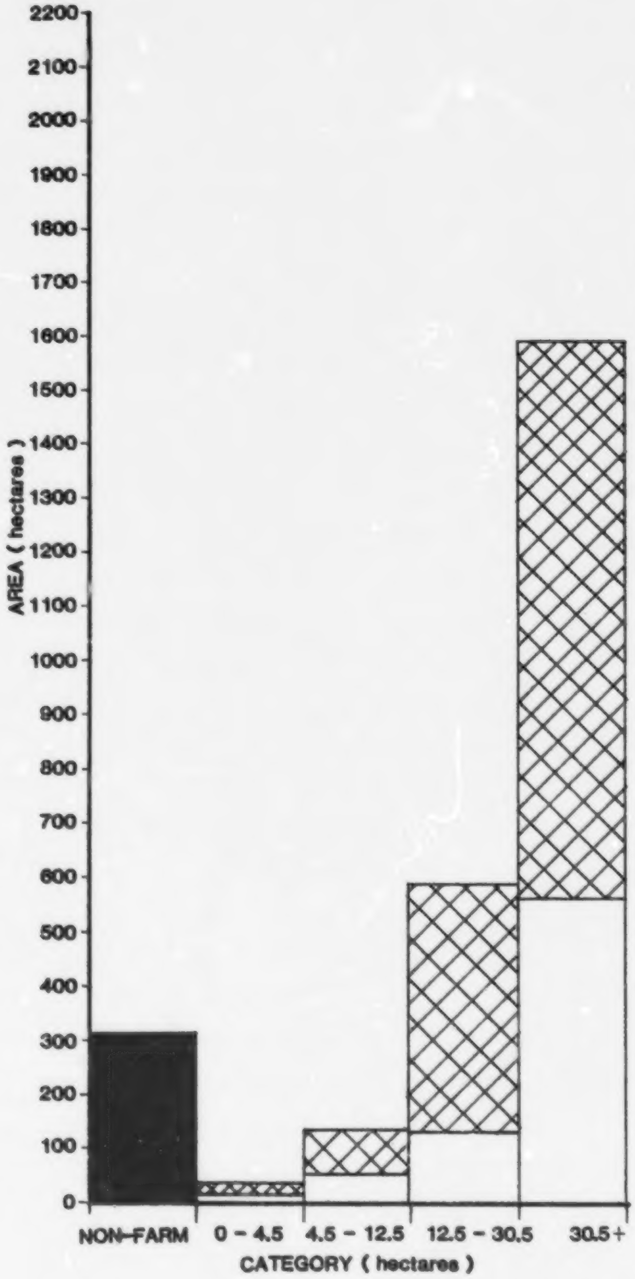
TENANT	▨
OWNED	☐
NON-FARM	■

FIGURE D-6

PI - 1N

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE (ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	97	303·18	3·13
FARMED TENANT PROPERTIES	65	1599·38	24·61
FARMED OWNED PROPERTIES	27	732·07	27·11
TOTAL	189	2634·63	13·94



on-site rented land. This represents 15% on average of their operating land base.

The tillable portion of the vicinity in 1984 supported 658 ha of corn, 543 ha of hay, 235 ha of soybeans, 599 ha of small grains and 132 ha of other crops. Livestock in the vicinity area included 426 head of dairy cattle, 463 head of beef cattle, 30,350 poultry and 66 horses. Livestock densities are 0.40/ha in the adjacent vicinity and 0.45/ha in the non-adjacent vicinities. These levels are moderately low.

None of the lands are zoned industrial or residential in the vicinity study area. The Town of Milton, the Town of Oakville and the Ministry of Government Services each own one property in the vicinity; in total, the public ownership adds up to only about 10 ha.

All the regional roads described on page D-24 and D-25 and local access road, Fourth Line, described on page D-34 serve site PI-1N. As well, First Line Road is a local access road exclusive to PI-1N. The small section of this local road from Brittania Road to the PI-1N entry point is considered as an access road only for the transfer route between PI-1N and LF-4N. The two properties along this section also border Brittania Road. One is a horse farm and the other property is associated with a large beef and cash crop operation. Local farmers make use of this road to access their properties with a variety of farm equipment.

4.2.3 Site Characteristics

Site PI-1N is situated on fairly level (0-2% slopes) Halton clay till with steeper slopes (2-5%) along an Oakville Creek tributary. While the Halton County soil survey (1:63,360 scale) showed the moderately well drained Oneida soil series along the eastern tributary and the western site boundary, the on-site inspection found only the imperfectly drained

Chinguacousy series on the sloping lands. Poorly drained Jeddo clay soils occupy the level depressions in the landscape.

The inspection revealed that, except for the Oakville tributary ravine, there is a fairly even soil capability split between Class 1 and Class 3 (Chinguacousy 47% of site area, Jeddo 37% of site area). Complex 2-9% slopes along the tributary reduce the rating of the Chinguacousy series to Class 2. This siting option contains 264 ha of Class 1 equivalents, the most of all siting options.

There is no tile drainage on site PI-1N. Even with tile drainage, delayed spring planting and poor soil aeration that restricts root development both would limit row crop production.

Site LF-4N is situated on relatively level Halton clay till. The Halton County soil survey (1:63,360) shows a large area of Jeddo series soils surrounded by imperfectly drained Chinguacousy series soils. However, on-site inspection revealed an even distribution of the two series in a pattern quite different from that shown on the County survey.

The Queenston Formation exposed at the base of the Niagara Escarpment is reflected in the "red phase" Halton clay till which appears frequently on-site. This suggests that the "red phase" till underlies the entire site, at a shallow depth.

Class 1 Chinguacousy series and Class 3 Jeddo series soils each occupy around 50% of the site. Since it is relatively flat, the topography does not limit the soil capability.

No subsurface tile drainage exists. The quality of row crops on the northern half and the pastured or idle land on the southern half was below par as could be expected with the extent of Class 3 soils present.

Untimely spring planting due to soil wetness and poor soil aeration during early growth stages particularly will affect row crop production. The "red phase" till does not affect either crop performance or diversity.

There is no tile drainage on site LF-4N, however, even with artificial drainage delayed spring planting and non-uniform crop development would constrain row cropping.

The combined on-site properties include 343 ha, most of which (77%) are classified as farm land. An estimated 192 ha are considered tillable and support 48 ha of hay, 47 ha of winter wheat, 42 ha of corn, 24 ha of soybeans and 29 ha of mixed grain.

Two farm respondents reside and have their farm headquarters on-site. Both of these farms are small; one is 20 ha is size and the other 4 ha. One respondent classified himself as a part-time farmer with full-time off-farm employment; the other is a full-time farmer with full-time off-farm employment. In terms of livestock, the two operations contain 32 horses.

Six off-site farmers rent and work on-site lands. None of them use the on-site lands for housing livestock or poultry. The estimate gross farm revenue from the on-site cropped lands in 1984 was $77,000.

4.3 SITING OPTION LF-4N/PI-13N

4.3.1 Characteristics of Local Community

During the interviews, an above average number (77%) of the farmers classified themselves as full-time farmers and 59% have no other source of employment. A low percentage (58%) of the farm operators were below the age of 55 at the time of the interview.

As a group they farm 7,816 ha of land. Tillable acreage comprises 93% or 4,470 ha. In the local agricultural community 84% of the land is farmed; of this, only 26% is owned and the remaining 74% is farmed on a rental basis. Figure D-7 shows that the area is dominated by large land parcels but that a very large proportion of these are tenant farmed. There are more non-farm parcels at PI-13N but LF-4N has more small parcels that are farmed than does PI-13N.

Hay is the most prevalent crop, accounting for about 30% of the cropped land in the agricultural community study area. Corn, winter wheat and soybeans make up the majority of the remaining cropped land. Altogether the farmers in the local community have 1159 livestock animal units, a relatively low number.

Within a 5 km radius of the site centre in 1981, there were $9,887,000 in gross farm sales. Of all the siting options LF-4N/PI-13N has the highest value of gross farm sales, as well as the highest value of sales. The principal reason for this high value is a belt of specialty horticultural crops that are grown in the vicinity of Trafalgar Road just east of Site PI-13N.

4.3.2 Site Vicinity Characteristics

The site vicinity consists largely of agricultural land. Only 3% is used for non-agricultural purposes. Most of the soils in the area are capability Class 1 (66%) and Class 3 (18%). Classes 2, 4 and 7 occur to a lesser extent. The Class 1 equivalents constitute 84% of the site vicinity area.

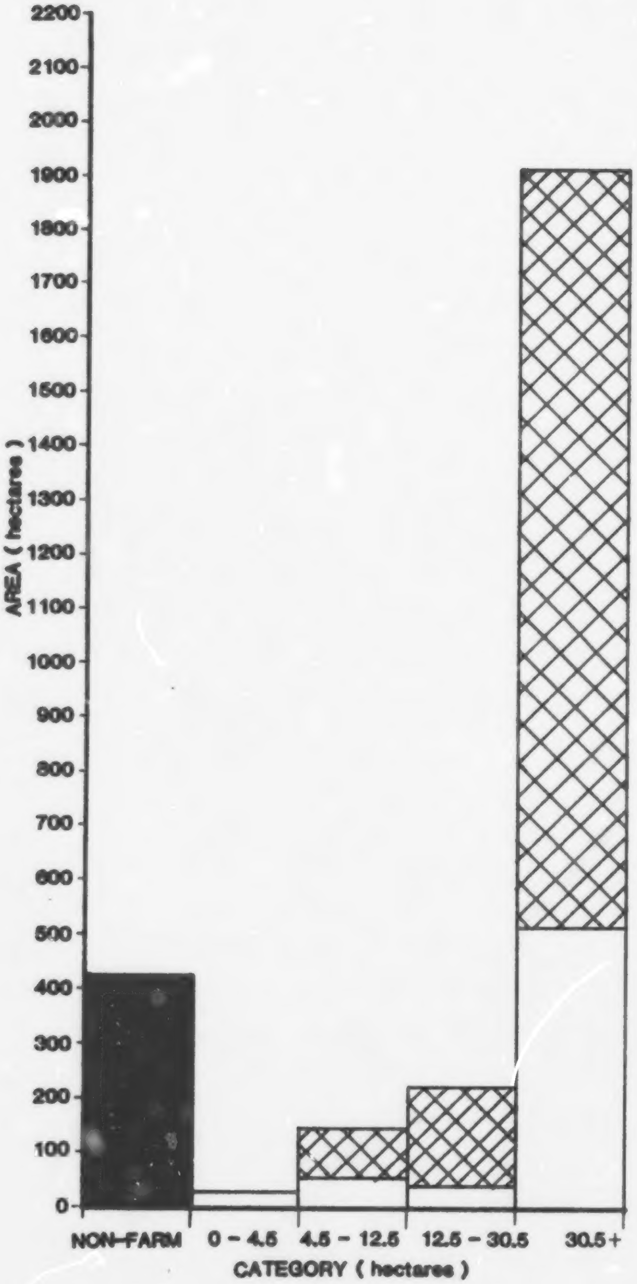
Within the vicinity there are 27 farms with headquarters; 8 of these adjacent to the sites. Also, 11 farm operators own land adjacent to the sites. One farm would lose 79 ha of on-site rented lands. These constitute 15% of his total land base.

FIGURE D-7

PI - 13N

SUMMARY OF STUDY AREA PROPERTIES

	NO. OF PROPERTIES	TOTAL SIZE (ha)	AVERAGE SIZE (ha)
NON-FARM PROPERTIES	139	423.63	3.05
FARMED TENANT PROPERTIES	58	1706.08	29.42
FARMED OWNED PROPERTIES	19	592.27	31.17
TOTAL	216	2721.98	13.60



TENANT	▨
OWNED	☐
NON-FARM	■

No lands are zoned industrial or residential in the PI-13N vicinity area. Public ownership accounts for just over 550 ha of the vicinity area. The Ontario Land Corporation is by far the largest of the public owner.

Fourth Line, from Derry Road south to Britannia Road is a local access road. The types of farming are mixed between cash cropping, dairy, beef feedlots, and mixed livestock operations. Of the 11 properties, 5 contain farm headquarters. Several farmers work more than one property, therefore, making use of Fourth Line for access. There are also two non-local farmers, plus others in the area who travel Fourth Line with equipment.

There are 12 farm properties along the other local access road to PI-13N, Fifth Line; six have headquarters. There is a mix of dairy, beef and cash crop farms. Only one farmer is non-local, several others farm properties on Brittania and/or Trafalgar as well as on Fifth Line. Therefore, there is much equipment movement on this road.

The farming characteristics at Derry Road between Fourth and Fifth Line Road are covered in the two above paragraphs.

4.3.3 Site Characteristics

Site PI-13N is located on level Halton clay till between Sixteen Mile Creek and a small tributary, site PI-13N's acquisition area consists of imperfectly and poorly drained Chinguacousy and Jeddo clay loam soils predominately on 0-2% slopes, (Classes 1 and 3). Class 2 soils (Chinguacousy) are found on 2-5% slopes adjacent to the major drainage channels.

Except for a small ravine ($7\frac{t}{r}$) draining into Sixteen Mile Creek the site is evenly divided between the Chinguacousy and Jeddo series. Because of the Class 3 Jeddo series soils which predominate in the depressional areas the use effectiveness of the better drained Class 1 Chinguacousy soils is limited.

Soil conditions on Site LF-4N were described above under siting option LF-4N/PI-1N.

The LF-4N/PI-13N on-site properties are 323 ha in size; all but 58 ha of idle land are used for farming purposes. An estimated 81% are considered tillable on which are grown 116 ha of hay, 44 ha of mixed grain, 24 ha of corn, 15 ha of winter wheat, 12 ha of soybeans and 18 ha of other crops.

Four farm respondents reside and have their farm headquarters located on-site. Two of these farmers are classified as full-time farmers with no off-farm employment, one is a part-time farmer with full-time off-farm work and the other is a full-time farmer with full-time off-farm work.

One of the on-site farm respondents operates a dairy farm with 125 dairy cattle which account for the majority of livestock located on-site. Another has two beef cattle, 50 chickens and nine horses. The two others raise a total of 32 horses. The on-site properties, in 1984, generated an estimated $177,300 in gross farm revenue.

Of the farm on-site lands, only 9% is farmed by the owner, in one case a 20 ha parcel and in another case a 4 ha parcel.

None of the site lands have been zoned residential or industrial. Almost all of Site PI-13N is publicly owned. The Ontario Land Corporation hold slightly less than 150 ha. Site LF-4N is entirely in private ownership.

TABLE D-1

COMPARATIVE EVALUATION OF SITING OPTIONS

A: ATTRIBUTES OF FARM OPERATORS IN THE SITE, ADJACENT AND NON-ADJACENT STUDY AREAS

	LF-1E	LF-1E PI-27E	LF-9C	LF-3C	LF-4N PI-1N	LF-4N PI-13N
Total Farmers	38	44	42	48	41	51
Full-time Farmers						
Off-farm Employment						
None	7	9	25	25	23	25
Some	2	2	0	1	4	4
Full-time	5	6	7	3	5	8
Part-time Farmers						
Off-farm Employment						
None	0	0	0	1	0	2
Some	1	1	0	0	0	1
Full-time	14	17	5	13	5	8
Hobby Farmers	4	4	2	1	1	1
Other Farmers	5	5	3	4	3	2

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

B: TENURE STATUS AND TILLABLE HECTARES IN THE SITE, ADJACENT AND NON-ADJACENT STUDY AREAS

	LF-1E	LF-1E PI-27E	LF-9C	LF-3C	LF-4N PI-1N	LF-4N PI-13N
Hectares Farmed	1775	2960	2773	3144	7413	7816
Hectares Owned	926	1096	2176	2619	1518	2035
Hectares Rented	770	1784	597	524	5721	5694
Hectares Unknown Operator	78	78	0	0	174	89
Hectares Tillable	1333	2268	2342	2550	6492	6986

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

C(1): STATUS OF PROPERTIES IN THE STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
SITE: LF-1E				
Total Hectares	1679	228*	275	1176
Farm Hectares	1318	170	230	918
Resident Owned	488	120	49	319
Owned	258	32	38	188
Tenant	495	18	144	333
Resident Owned Tenant	0	0	0	0
Owned Tenant	0	0	0	0
Resident Tenant	77	0	0	77
Idle Land	81	48	22	11
SITE: LF-1E/PI-27E				
Total Hectares	2561	295*	521	1745
Farm Hectares	1697	251	432	1014
Resident Owned	532	64	80	388
Owned	257	32	100	125
Tenant	822	155	244	423
Resident Owned Tenant	0	0	0	0
Owned Tenant	6	0	6	0
Resident Tenant	77	0	0	77
Idle Land	192	33	36	123

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* This table excludes non-agricultural land and is, thus, smaller than the site acquisition area.

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

C(2): STATUS OF PROPERTIES IN THE STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
SITE: LF-9C				
Total Hectares	1675	121*	358	1196
Farm Hectares	1564	81	338	1145
Resident Owned	907	61	216	630
Owned	304	20	19	265
Tenant	257	0	66	191
Resident Owned Tenant	0	0	0	0
Owned Tenant	39	0	0	39
Resident Tenant	57	0	37	20
Idle Land	91	40	20	31
SITE: LF-3C				
Total Hectares	1955	203*	523	1229
Farm Hectares	1955	203	523	1229
Resident Owned	792	83	100	609
Owned	751	44	372	335
Tenant	158	76	21	61
Resident Owned Tenant	35	0	0	35
Owned Tenant	0	0	0	0
Resident Tenant	219	0	30	189
Idle Land	0	0	0	0

TABLE D-1 - cont´d

COMPARATIVE EVALUATION OF SITING OPTIONS

C(3): STATUS OF PROPERTIES IN THE STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
SITE: LF-4N/PI-1N				
Total Hectares	3005	284*	888	1833
Farm Hectares	2899	226	882	1791
Resident Owned	714	24	275	415
Owned	169	0	117	52
Tenant	1850	190	490	1170
Resident Owned Tenant	118	0	0	118
Owned Tenant	0	0	0	0
Resident Tenant	48	12	0	36
Idle Land	106	58	6	42
SITE: LF-4N/PI-13N				
Total Hectares	3591	323*	789	2479
Farm Hectares	3397	265	789	2343
Resident Owned	702	24	348	330
Owned	177	0	116	61
Tenant	2188	140	325	1723
Resident Owned Tenant	294	101	0	193
Owned Tenant	0	0	0	0
Resident Tenant	36	0	0	36
Idle Land	194	58	0	136

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

D(1): LIVESTOCK KEPT ON PROPERTIES IN LF-1E AGRICULTURAL STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Dairy Cows	0	0	0	0
Dairy Cows (under 1 yr)	0	0	0	0
Replacement Heifers	0	0	0	0
Total Dairy Cattle	0	0	0	0
Beef Cows	112	6	3	103
Beef Calves	68	7	0	61
Replacement Heifers	8	3	0	5
Feeder Cattle	86	25	0	61
Bulls	3	0	0	3
Total Beef Cattle	277	41	3	233
Sows	32	0	0	32
Boars	2	0	0	2
Replacement Gilts	0	0	0	0
Pigs (under 2 months)	176	0	0	176
Feeder Pigs	87	2	0	85
Total Pigs	297	2	0	295
Layer Hens	890	300	0	590
Broilers	40	0	0	40
Total Chickens	930	300	0	630
Horses	66	49	3	14
Other	3317	185	2050	1082
Livestock Animal Units	584	103	108	373

NOTE: Livestock animal units are calculated on the basis of the consumption using the following factors:
1.000 for cattle and horses 0.222 for pigs
0.011 for chickens 0.050 for other livestock.

TABLE D-1 - cont´d

COMPARATIVE EVALUATION OF SITING OPTIONS

D(2): LIVESTOCK KEPT ON PROPERTIES IN LF-1E/PI-27E AGRICULTURAL STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Dairy Cows	41	0	0	41
Dairy Cows (under 1 yr)	20	0	0	20
Replacement Heifers	24	0	0	24
Total Dairy Cattle	85	0	0	85
Beef Cows	112	35	0	77
Beef Calves	68	12	0	56
Replacement Heifers	8	3	0	5
Feeder Cattle	96	5	20	71
Bulls	3	0	0	3
Total Beef Cattle	287	55	20	212
Sows	44	0	2	42
Boars	2	0	0	2
Replacement Gilts	0	0	0	0
Pigs (under 2 months)	176	0	0	176
Feeder Pigs	87	2	0	85
Total Pigs	309	2	2	305
Layer Hens	890	100	200	590
Broilers	35040	0	35000	40
Total Chickens	35930	100	35200	630
Horses	66	49	0	17
Other	3319	335	52	2932
Livestock Animal Units	1067	122	410	535

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

D(3): LIVESTOCK KEPT ON PROPERTIES IN LF-9C AGRICULTURAL STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Dairy Cows	284	35	167	82
Dairy Cows (under 1 yr)	113	4	67	42
Replacement Heifers	79	5	49	25
Total Dairy Cattle	476	44	283	149
Beef Cows	54	0	0	54
Beef Calves	62	0	0	62
Replacement Heifers	24	12	0	12
Feeder Cattle	1406	0	6	1400
Bulls	5	0	3	2
Total Beef Cattle	1551	12	9	1530
Sows	84	0	0	84
Boars	3	0	0	3
Replacement Gilts	0	0	0	0
Pigs (under 2 months)	160	0	0	160
Feeder Pigs	710	0	0	710
Total Pigs	957	0	0	957
Layer Hens	22194	20	58	22116
Broilers	86936	36	12500	74400
Total Chickens	109130	56	12558	96516
Horses	13	1	7	5
Other	216	30	81	105
Livestock Animal Units	3462	59	441	2961

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

D(4): LIVESTOCK KEPT ON PROPERTIES IN LF-3C AGRICULTURAL STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Dairy Cows	531	0	106	425
Dairy Cows (under 1 yr)	193	0	0	193
Replacement Heifers	278	41	44	193
Total Dairy Cattle	1002	41	150	811
Beef Cows	21	0	3	18
Beef Calves	83	0	3	80
Replacement Heifers	4	0	0	4
Feeder Cattle	58	0	19	39
Bulls	8	0	6	2
Total Beef Cattle	174	0	31	143
Sows	167	0	0	167
Boars	8	0	0	8
Replacement Gilts	22	0	0	22
Pigs (under 2 months)	605	0	0	605
Feeder Pigs	755	0	0	755
Total Pigs	1557	0	0	1557
Layer Hens	227	0	0	227
Broilers	22209	0	0	22209
Total Chickens	22436	0	0	22436
Horses	19	0	0	19
Other	830	0	43	787
Livestock Animal Units	1826	41	183	1602

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

D(5): LIVESTOCK KEPT ON PROPERTIES IN LF-4N/PI-1N AGRICULTURAL STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Dairy Cows	280	0	110	170
Dairy Cows (under 1 yr)	68	0	28	40
Replacement Heifers	78	0	35	43
Total Dairy Cattle	426	0	173	253
Beef Cows	91	0	43	48
Beef Calves	168	0	38	130
Replacement Heifers	31	0	19	12
Feeder Cattle	165	0	8	157
Bulls	8	0	6	2
Total Beef Cattle	463	0	114	349
Sows	4	0	4	0
Boars	0	0	0	0
Replacement Gilts	0	0	0	0
Pigs (under 2 months)	0	0	0	0
Feeder Pigs	0	0	0	0
Total Pigs	4	0	4	0
Layer Hens	305	0	100	205
Broilers	30050	0	50	30000
Total Chickens	30355	0	150	30205
Horses	98	32	24	42
Other	328	110	115	103
Livestock Animal Units	1338	37	319	981

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

D(6): LIVESTOCK KEPT ON PROPERTIES IN LF-4N/PI-13N AGRICULTURAL STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Dairy Cows	449	65	183	201
Dairy Cows (under 1 yr)	149	30	63	56
Replacement Heifers	211	30	80	101
Total Dairy Cattle	809	125	326	358
Beef Cows	152	1	35	116
Beef Calves	84	1	20	63
Replacement Heifers	21	0	0	21
Feeder Cattle	261	0	58	203
Bulls	13	0	6	7
Total Beef Cattle	531	2	119	410
Sows	4	0	4	0
Boars	0	0	0	0
Replacement Gilts	0	0	0	0
Pigs (under 2 months)	0	0	0	0
Feeder Pigs	0	0	0	0
Total Pigs	4	0	4	0
Layer Hens	175	50	25	100
Broilers	50	0	0	50
Total Chickens	225	50	25	150
Horses	99	41	25	33
Other	283	168	0	115
Livestock Animal Units	1457	177	471	808

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

E(1): DISPOSITION OF LAND IN THE STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
SITE: LF-1E				
Total Hectares	1680	228*	275	1176
Farm Hectares	1318	170	230	918
Tillable	966	134	142	690
Tile Drained	3	0	0	3
Permanent Pasture	23	0	2	21
Swamp	30	0	10	20
Forest	268	32	70	166
Idle Hectares	81	48	22	11
SITE: LF-1E/PI-27E				
Total Hectares	1831.4	259.4*	466	1106
Farm Hectares	1639.4	226.4	430	983
Tillable	1228	190	346	692
Tile Drained	3	0	0	3
Permanent Pasture	22	3	0	19
Swamp	33.4	0.4	0	33
Forest	353	33	84	236
Idle Hectares	192	33	36	123

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* This table excludes non-agricultural land and is, thus, smaller than the site acquisition area.

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

E(2): DISPOSITION OF LAND IN THE STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
SITE: LF-9C				
Total Hectares	2002	120*	539	1343
Farm Hectares	1911	80	519	1312
Tillable	1273	69	295	909
Tile Drained	437	19	186	232
Permanent Pasture	43	3	17	23
Swamp	63	6	2	55
Forest	114	2	19	93
Idle Hectares	91	40	20	31
SITE: LF-3C				
Total Hectares	2454	254*	760	1440
Farm Hectares	2454	254	760	1440
Tillable	1572	165	441	966
Tile Drained	561	57	246	258
Permanent Pasture	59	0	12	47
Swamp	24	4	5	15
Forest	238	28	56	154
Idle Hectares	0	0	0	0

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

E(3): DISPOSITION OF LAND IN THE STUDY AREAS

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
SITE: LF-4N/PI-1N				
Total Hectares	2870.4	264.4*	883	1723
Farm Hectares	2764.4	206.4	877	1681
Tillable	2338	192	703	1443
Tile Drained	174	0	83	91
Permanent Pasture	133	1	47	85
Swamp	16.4	0.4	5	11
Forest	103	13	39	51
Idle Hectares	106	58	6	42
SITE: LF-4N/PI-13N				
Total Hectares	3563.4	313.4*	830	2420
Farm Hectares	3369.4	255.4	830	2284
Tillable	2845	227	646	1972
Tile Drained	245	0	84	161
Permanent Pasture	140	19	49	72
Swamp	19.4	0.4	6	13
Forest	120	9	45	66
Idle Hectares	194	58	0	136

TABLE D-1 - cont´d

COMPARATIVE EVALUATION OF SITING OPTIONS

F(1): CROPPING PATTERNS IN THE LF-1E STUDY AREA

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Total Hectares of Cropped Land	844	107	138	599
Corn	243	14	31	198
Barley	17	0	11	6
Soybeans	0	0	0	0
Winter Wheat	147	15	30	102
Hay	366	79	66	221
Oats	0	0	0	0
Market Garden	2	0	0	2
Clover/Trefoil Seed	40	0	0	40
Fruit Trees	2	0	0	2
Mixed Grain	0	0	0	0
Other	28	0	0	28

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

F(2): CROPPING PATTERNS IN THE LF-1E/PI-27E STUDY AREA

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Total Hectares of Cropped Land	1101	156	294	651
Corn	322	58	79	185
Barley	54	0	11	43
Soybeans	36	0	0	36
Winter Wheat	178	18	73	87
Hay	427	72	131	224
Oats	12	0	0	12
Market Garden	2	0	0	2
Clover/Trefoil Seed	40	0	0	40
Fruit Trees	2	0	0	2
Mixed Grain	0	0	0	0
Other	28	8	0	20

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

F(3): CROPPING PATTERNS IN THE LF-9C STUDY AREA

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Total Hectares of Cropped Land	1216.4	64	291	861.4
Corn	360	3	127	230
Barley	77	7	5	65
Soybeans	94	0	14	80
Winter Wheat	126	0	33	93
Hay	509	54	96	359
Oats	38	0	16	22
Market Garden	0.4	0	0	0.4
Clover/Trefoil Seed	0	0	0	0
Fruit Trees	0	0	0	0
Mixed Grain	10	0	0	10
Other	2	0	0	2

TABLE D-1 - cont´d

COMPARATIVE EVALUATION OF SITING OPTIONS

F(4): CROPPING PATTERNS IN THE LF-3C STUDY AREA

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Total Hectares of Cropped Land	1477.4	145	440	892.4
Corn	357	25	155	177
Barley	61	0	22	39
Soybeans	9	9	0	0
Winter Wheat	151	56	20	75
Hay	835	42	230	563
Oats	46	13	12	21
Market Garden	0.4	0	0	0.4
Clover/Trefoil Seed	0	0	0	0
Fruit Trees	5	0	1	4
Mixed Grain	9	0	0	9
Other	4	0	0	4

TABLE D-1 - cont'd

COMPARATIVE EVALUATION OF SITING OPTIONS

F(5): CROPPING PATTERNS IN THE LF-4N/PI-1N STUDY AREA

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Total Hectares of Cropped Land	2358	191	699	1468
Corn	700	42	249	409
Barley	32	0	0	32
Soybeans	259	24	81	154
Winter Wheat	323	47	119	157
Hay	591	48	221	322
Oats	180	0	0	180
Market Garden	3	0	0	3
Clover/Trefoil Seed	0	0	0	0
Fruit Trees	36	0	0	36
Mixed Grain	123	12	29	82
Other	111	18	0	93

TABLE D-1 - cont´d

COMPARATIVE EVALUATION OF SITING OPTIONS

F(6): CROPPING PATTERNS IN THE LF-4N/PI-13N STUDY AREA

	TOTAL	ON-SITE	ADJACENT FARMS	NON-ADJACENT FARMS
Total Hectares of Cropped Land	2800	229	637	1934
Corn	545	24	122	399
Barley	72	0	17	55
Soybeans	236	12	51	174
Winter Wheat	428	15	120	292
Hay	914	116	250	548
Oats	223	0	10	213
Market Garden	15	0	0	15
Clover/Trefoil Seed	4	0	0	4
Fruit Trees	51	0	0	51
Mixed Grain	169	44	41	84
Other	143	18	26	99

APPENDIX E

ACCESS ROAD ANALYSIS AND LOCATION OF THE PHYSICAL/CHEMICAL TREATMENT PLANT DATA TABLES

TABLE E-1

PRELIMINARY PHASE 4A ANALYSIS OF ACCESS ROAD OPTIONS - DATA RESULTS

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank	Comments
		Length (km)	No. of Active Farms	No. of farms with Livestock	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	No. of farms with Livestock	Sensitive Crops ($000's)		
LF-3C	1. From QEW-south on Vineland Townline Rd. (Reg. Rd. 24); west on Hwy, 20; south on Reg. Rd. 27; west on Elcho Rd. to LF-3C	4.9	14	12	3.4	28.8	41	32	2,007	6	
	2. From QEW-south on Reg. Rd. 18 (Beamsville Rd); west on Reg. Rd. 69 (Twenty Mile Rd.); south on Reg. Rd. 569; south on Hwy. 20; south on Reg. Rd. 27; west on Elcho Rd. to LF-3C	4.9	14	12	3.4	20.7	33	24	2,060	5	Option eleminated in preliminary Phase 4A analysis
	3. From QEW-south on Reg. Rd. 14; south on Reg. Rd. 714; east on Reg. Rd. 73; south on Reg. Rd. 14; south on Reg. Rd. 16 to LF-3C	n/a	n/a	n/a	n/a	23.3	40	30	672	1	Eliminated in preliminary Phase 4A analysis
	4. From QEW-south on Reg. Rd. 18; west on Reg. Rd. 69; south on Hwy. 20; south on Reg. Rd. 27; west on Elcho Rd. to LF-3C	4.9	14	12	3.4	22.2	36	28	2,107	4	Route identified by transportation consultant Eliminated in preliminary Phase 4A analysis
	5. From QEW south on Vineland Rd. (Reg. Rd. 24); west on Hwy. 20; west on Reg. Rd. 65 from Bismark; south on Smithville Rd. to LF-3C	n/a	n/a	n/a	n/a	33.8	56	48	2,257	2	route identified by transportation consultant Eliminated in preliminary Phase 4A analysis
	6. From QEW-south on Vineland Rd. (Reg. Rd. 24); west on Hwy. 20; west on Reg. Rd. 65 from Bismark; south on Krick Rd. to LF-3C	2.9	0	0	2.2	28.8	47	41	2,095	3	Route identified by transportation consultant
LF-9C	1. From QEW-south on Vineland Rd. (Reg. Rd. 24); west on Hwy. 20 to LF-9C	1.4	0	0	.97	21.1	22	17	1,813	1	
	2. From QEW-south on Reg. Rd. 18; west on Reg. Rd. 69; south on Reg. Rd. 569; south on Hwy. 20 to LF-9C	1.4	0	0	.97	22.7	42	33	2,078	2	Deleted during preliminary Phase 4A analysis
	3. From QEW-wouth on Reg. Rd. 18; west on Reg. Rd. 69; south on Hwy. 20; east on Hwy. 20 to LF-9C	1.4	0	0	.97	22.5	47	37	2,124	3	Deleted during preliminary Phase 4A analysis Route identified by transportation consultant
LF-1E	1. From QEW-west on Reg. Rd. 47 (Biggar Rd.); south on Reg. Rd. 98 (Montrose Rd.); west on Carl Rd. to LF-1E	2.5	2	2	1.8	1.6	0	0	133	4	
	2. From QEW-west on Biggar Rd. south on Morris Rd. to LF-1E	1.1	0	0	.64	3.3	3	3	34.5	3	Route identified by transportation consultant eliminated in preliminary Phase 4A analysis
	3. From QEW-west on Biggar Rd. south on Crowland Rd. to LF-1E	3.1	1	1	2.08	2.5	1	1	20.5	5	Route identified by transportation consultant
	4. From QEW-west on Biggar Rd. south on Montrose Rd.; west on Young Rd. to LF-1E	1.7	1	0	1.2	2.9	0	0	25	1	route identified by transportation consultant
	5. From QEW-west on Biggar Rd. south on Montrose Rd; west on Schisler Rd. (Reg. Rd. 127) to LF-1E	n/a	n/a	n/a	n/a	6.7	1	1	60.4	2	route identified by transportation consultant
PI-1N	1. From 401-south on 4th line; west on Britannia Rd. to PI-1N	3.1	6	5	2.9	7.4	7	6	94	2	
	2. From 401-south on 4th line; west on Derry Rd; south on Hwy. 25 to PI-1N	n/a	n/a	n/a	n/a	10.3	11	8	125.9	1	Route identified by transportation consultant Deleted during preliminary Phase 4A analysis

TABLE E-1 - cont'd

PRELIMINARY PHASE 4A ANALYSIS OF ACCESS ROAD OPTIONS - DATA RESULTS

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank	Comments
		Length (km)	No. of Active Farms	No. of farms with Livestock	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	No. of farms with Livestock	Sensitive Crops ($000's)		
PI-13N	1. From 401-south on 4th line; east on Britannia Rd.; south on 5th line to PI-13N	5.0	9	8	4.6	4.0	6	5	69.3	3	
	2. From 401-south on 4th line; east on Derry Rd.; south on 5th line to PI-13N	5.0	4	4	5.08	4.0	3	2	74.2	1	Eliminated in preliminary Phase 4A analysis
	3. From 401-south on Trafalgar Rd.; west on Britannia Rd.; south on 5th line to PI-13N	1.9	3	3	1.68	8.3	15	9	170.9	2	Eliminated in preliminary Phase 4A analysis
PI-1N to LF-2N	1. East on Britannia Rd.; north on 4th line; east on Hwy. 401; north on Hwy. 10 to LF-2N	3.1	6	5	2.9	9.8	10	8	101	2	
	2. West on Britannia Rd.: north on Tremaine Rd.; east on Steeles Ave.; north on Hwy. 25; east on 401; north on Hwy. 10 to LF-2N	n/a	n/a	n/a	n/a	14	13	10	131	1	Eliminated in preliminary Phase 4A analysis
PI-13N to LF-2N	1. North on 5th line; east on Britannia Rd.; north on Trafalgar Rd. (Reg. Rd. 3); east on 401; north on Hwy. 10 to LF-2N	1.9	3	3	1.68	10.75	20	12	187	2	Deleted during preliminary Phase 4A analysis
	2. North on 5th line; west on Britannia Rd.; north on 4th line; east on 401; north on Hwy. 10 to LF-2N	5	9	8	4.6	6.4	9	7	76	4	
	3. North on 5th line; west on Derry Rd.; north on 4th line; east on 401; north on Hwy. 10 to LF-2N	5	4	4	5.08	6.4	7	4	81	1	Deleted during preliminary Phase 4A analysis
	4. North on 5th line; east on on Britannia Rd.; north on Trafalgar Rd.; east on Derry Rd. to LF-2N	1.9	3	3	1.68	19.9	19	10	351	3	Deleted during preliminary Phase 4A analysis Route identified by transportation consultant
LF-4N	1. From 401-south on 4th line; west on Britannia Rd. to LF-4N	3.1	6	5	2.9	9.6	6	6	132.9	2	
	2. From 401-south on 4th line; west on Derry Rd. (Reg. Rd. 25); south on Hwy. 25; west on Britannia Rd. to LF-4N	n/a	n/a	n/a	n/a	12.5	12	7	150	1	Route identified by transportation consultant Deleted during preliminary Phase 4A analysis

TABLE E-2

PRELIMINARY PHASE 4A ACCESS ROAD ANALYSIS - FACTOR SCALING AND OPTION RANKING

		Option 1		Option 2		Option 3		Option 4		Option 5		Option 6	
Factors	Weight	Scale	Score	Scale	Score	Scale	Score	Scale	Score	Scale	Score	Scale	Score
Option: to LF-3C													
Local Roads													
Length	3	100	300	100	300	0	0	100	300	0	0	59	177
Number of Active Farms	3	100	300	100	300	0	0	100	300	0	0	0	0
Soil Capability	1	100	100	100	100	0	0	100	100	0	0	65	65
Number of Active Farms with Livestock	3	100	300	100	300	0	0	100	300	0	0	0	0
Regional Roads													
Length	1	85	85	61	61	69	69	66	66	100	100	85	85
Number of Active Farms	3	73	221	59	177	71	213	64	192	100	300	84	252
Sensitive Crops	3	89	267	91	273	30	90	93	279	100	300	93	279
Number of Active Farms with Livestock	3	67	201	50	150	63	189	58	174	100	300	85	256
OPTION SCORE		1774		1661		561		1711		1000		1114	
OPTION RANK		6		5		1		4		2		3	
Option: to LF-9C													
Local Roads													
Length	3	100	300	100	300	100	300						
Number of Active Farms	3	0	0	0	0	0	0						
Soil Capability	1	100	100	100	100	100	100						
Number of Active Farms with Livestock	3	0	0	0	0	0	0						
Regional Roads													
Length	1	93	93	100	100	99	99						
Number of Active Farms	3	47	140	89	268	100	300						
Sensitive Crops	3	85	256	98	294	100	300						
Number of Active Farms with Livestock	3	46	138	89	268	100	300						
OPTION SCORE		1027		1330		1399							
OPTION RANK		1		2		3							
Option: to LF-1E													
Local Roads													
Length	3	81	243	35	105	100	300	55	165	0	0		
Number of Active Farms	3	100	300	0	0	50	150	50	150	0	0		
Soil Capability	1	87	87	31	31	100	100	58	58	0	0		
Number of Active Farms	3	100	300	0	0	50	150	0	0	0	0		
Regional Roads													
Length	1	24	24	49	49	37	37	43	43	100	100		
Number of Active Farms	3	0	0	100	300	33	99	0	0	33	99		
Sensitve Crops	3	22	66	57	171	34	102	41	123	100	300		
Number of Active Farms with Livestock	3	0	0	100	300	33	99	0	0	33	99		
OPTION SCORE		1020		956		1037		539		598			
OPTION RANK		4		3		5		1		2			

Score = weight x scale

For a description of each option see Table E-1.

TABLE E-2 - cont'd

PRELIMINARY PHASE 4A ACCESS ROAD ANALYSIS - FACTOR SCALING AND OPTION RANKING

Factors	Weight	Option 1		Option 2		Option 3	
		Scale	Score	Scale	Score	Scale	Score
Option: LF-2N to PI-1N to PI-1N							
Local Roads							
Length	3	100	300	0	0		
Number of Active Farms	3	100	300	0	0		
Soil Capability	1	100	100	0	0		
Number of Active Farms with Livestock	3	100	300	0	0		
Regional Roads							
Length	1	72	72	100	100		
Number of Active Farms	3	64	191	100	300		
Sensitive Crops	3	75	225	100	300		
Number of Active Famrs with Livestock	3	75	225	100	300		
OPTION SCORE		1713		1000			
OPTION RANK		2		1			
Option: PI-1N to LF-2N							
Local Roads							
Length	3	100	300	0	0		
Number of Active Farms	3	100	300	0	0		
Soil Capability	1	100	100	0	0		
Number of Active Farms with Livestock	3	100	300	0	0		
Regional Roads							
Length	1	70	70	100	100		
Number of Active Farms	3	77	231	100	300		
Sensitive Crops	3	77	231	100	300		
Number of Active Farms with Livestock	3	80	240	100	300		
OPTION SCORE		1772		1000			
OPTION RANK		2		1			
Option LF-2N to PI-13N to PI-13N							
Local Roads							
Length	3	100	300	100	300	38	114
Number of Active Farms	3	100	300	44	133	33	99
Soil Capability	1	91	91	100	100	33	33
Number of Active Farms with Livestock	3	100	300	50	150	38	113
Regional Roads							
Length	1	48	48	48	48	100	100
Number of Active Farms	3	40	120	20	60	100	300
Sensitive Crops	3	41	123	43	129	100	300
Number of Active Farms with Livestock	3	56	168	22	66	100	300
OPTION SCORE		1450		986		1359	
OPTION RANK		3		1		2	

Score = weight x scale

For a description of each option see Table E-1.

TABLE E-2 - cont'd

PRELIMINARY PHASE 4A ACCESS ROAD ANALYSIS - FACTOR SCALING AND OPTION RANKING

		Option 1		Option 2		Option 3		Option 4	
Factors	Weight	Scale	Score	Scale	Score	Scale	Score	Scale	Score
Option: PI-13N to LF-2N									
Local Roads									
Length	3	38	114	100	300	100	300	38	114
Number of Active Farms	3	33	99	100	300	44	133	33	99
Soil Capability	1	33	33	91	91	100	100	33	33
Number of Active Farms with Livestock	3	38	114	100	300	50	150	38	114
Regional Roads									
Length	1	54	54	32	32	32	32	100	100
Number of Active Farms	3	100	300	45	135	35	105	95	285
Sensitive Crops	3	53	160	22	66	23	69	100	300
Number of Active Farms with Livestock	3	100	300	58	175	33	99	83	250
OPTION SCORE		1174		1399		988		1295	
OPTION RANK		2		4		1		3	

		Option 1		Option 2	
Factors	Weight	Scale	Score	Scale	Score
Option: LF-4N to PI-1N to LF-4N					
Local Roads					
Length	3	100	300	0	0
Number of Active Farms	3	100	300	0	0
Soil Capability	1	100	100	0	0
Number of Active Farms	3	100	300	0	0
Regional Roads					
Length	1	77	77	100	100
Number of Active Farms	3	50	150	100	300
Sensitive Crops	3	89	267	100	300
Number of Active Farms with Livestock	3	86	258	100	300
OPTION SCORE		1752		1000	
OPTION RANKING		2		1	

Score = weight x scale

For description of each option see Table E-1.

TABLE E-3

PHASE 4A ANALYSIS OF ACCESS ROAD OPTIONS - DATA RESULTS

FACTORS	LF-2N		LF-4N		PI-1N		PI-13N	
	from 401 (1)	from 410 (2)	from 401 (1)	from QEW (2)	from 401 (1)	from QEW (2)	from 401 (1)	from QEW (2)
No. of Farm Operations With Headquarters	3	0	16	7	15	3	17	16
No. of Parcels With No Headquarters	3	4	23	33	13	12	9	29
Farm Machinery Movements (km/yr)	1,823	3,691	21,367	11,823	16,682	2,652	14,041	13,499
Livestock and Poultry Housed (Animal Units)	168	18	621	780	756	20	697	534
Livestock Pastured (no.)	180	0	292	152	292	1	314	426
Cattle Crossings (no./yr)	0	0	10	0	10	0	10	0
Service Vehicle Stops (no./yr)	220	149	5,876	289	5,888	34	4,964	1,889
Customer Stops (no./yr)	0	0	5,510	0	5,510	0	1,860	3,650
Crops Within 800 m (ha)	179	120	1,496	1,466	1,130	852	1,029	1,621
Tillable Land (ha)	245	113	1,325	1,285	1,001	533	1,019	1,500
Class 1 Equivalents (ha)	0	0	1,085	0	0.9	0	0.9	0
Length of Access Road Option (km)	2.2	1.8	12.4	16.0	8.3	9.7	7.9	16.7

TABLE E-3 - cont'd

PHASE 4A ANALYSIS OF ACCESS ROAD OPTIONS - DATA RESULTS

FACTORS	LF-3C from QEW (1)	LF-3C from QEW (2)	LF-9C from QEW (1)	LF-1E from QEW (1)	LF-1E from QEW (2)	LF-1E from QEW (5)	LF-1E from QEW (6)	PI-27E from QEW (1)	PI-27E from QEW (2)
No. of Farm Operations With Headquarters	69	65	35	4	1	1	4	0	0
No. of Parcels With No Headquarters	49	51	33	9	6	6	7	0	0
Farm Machinery Movements (km/yr)	42,648	56,630	20,497	524	270	290	505	0	0
Livestock and Poultry Housed (Animal Units)	6,260	7,578	1,687	152	46	46	152	0	0
Livestock Pastured (no.)	682	1,100	314	24	30	30	24	0	0
Cattle Crossings (no./yr)	0	517	0	0	0	0	0	0	0
Service Vehicle Stops (no./yr)	16,028	16,035	8,601	48	10	10	48	0	0
Customer Stops (no./yr)	20,786	20,786	20,711	0	0	0	0	0	0
Crops Within 800 m (ha)	3,639	3,575	2,233	280	361	341	254	61	63
Tillable Land (ha)	2,856	2,953	1,529	247	176	215	239	0	0
Class 1 Equivalents (ha)	0	1.27	0	0	0	0.26	0	0	0
Length of Access Road Option (km)	32.0	31.0	21.7	4.3	4.5	4.3	4.5	1.4	1.2

TABLE E-3 - cont'd

PHASE 4A ANALYSIS OF ACCESS ROAD OPTIONS - DATA RESULTS

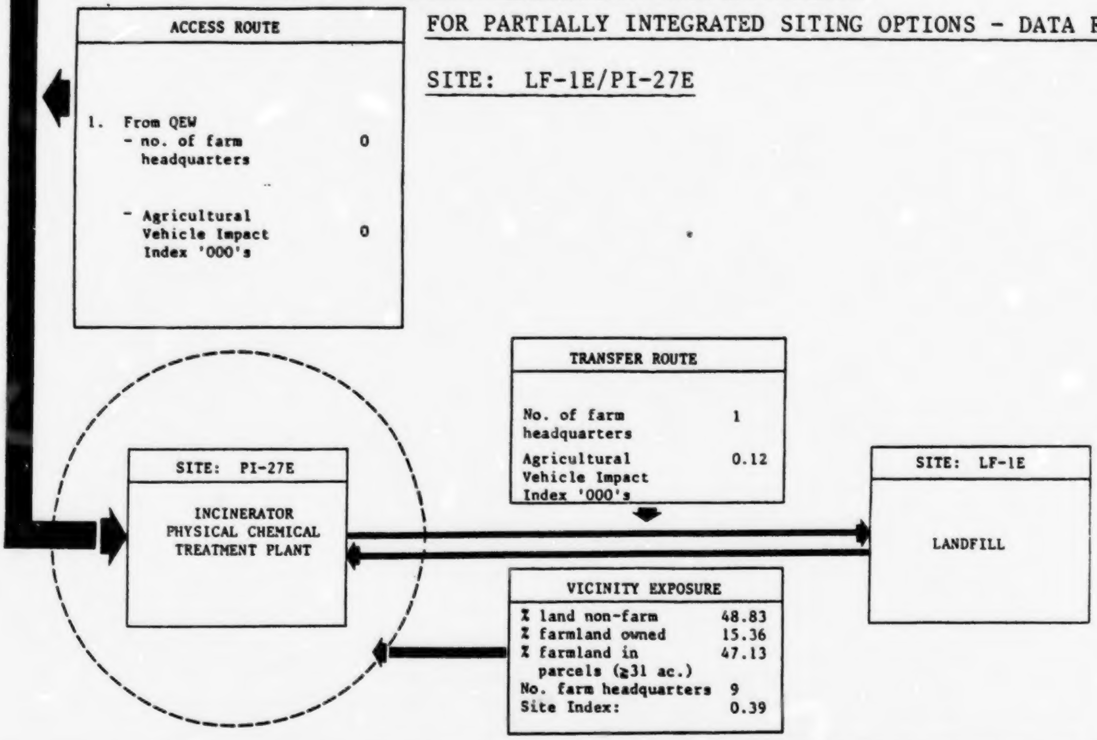
FACTORS	PI-1N to LF-4N (1)	PI-1N to LF-4N (2)	PI-13N to LF-4N (1)	PI-1N to LF-2N (1)	PI-13N to LF-2N (1)	PI-27E to LF-1E (1)	PI-27E to LF-1E (2)	PI-27E to LF-1E (5)	PI-27E to LF-1E (6)
No. of Farm Operations With Headquarters	1	3	11	19	21	4	1	1	4
No. of Parcels With No Headquarters	6	9	16	16	12	9	6	6	7
Farm Machinery Movements (km/yr)	2,270	3,262	11,047	19,213	16,572	524	270	290	505
Livestock and Poultry Housed (Animal Units)	0	382	355	924	865	152	46	46	152
Livestock Pastured (no.)	25	257	274	472	494	24	30	30	24
Cattle Crossings (no./yr)	0	0	0	10	10	0	0	0	0
Service Vehicle Stops (no./yr)	48	268	1,815	6,008	5,303	48	10	10	48
Customer Stops (no./yr)	0	0	3,650	5,510	1,860	0	0	0	0
Crops Within 800 m (ha)	393	617	1,078	1,309	1,394	280	361	341	254
Tillable Land (ha)	184	323	863	1,287	1,304	247	176	215	239
Class 1 Equivalents (ha)	0.2	0.2	0.2	0.9	0.9	0	0	0.26	0
Length of Access Road Option (km)	3.4	4.8	9.0	11.2	10.1	4.5	4.5	4.3	4.3

Option 1 - Rank = 1

FIGURE E-1

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT FOR PARTIALLY INTEGRATED SITING OPTIONS - DATA RESULTS

SITE: LF-1E/PI-27E


SITE: PI-27E
INCINERATOR
PHYSICAL CHEMICAL
TREATMENT PLANT
SITE: LF-1E
LANDFILL

ACCESS ROUTE

1. From QEW
   - no. of farm headquarters 0
   - Agricultural Vehicle Impact Index '000's 0

TRANSFER ROUTE

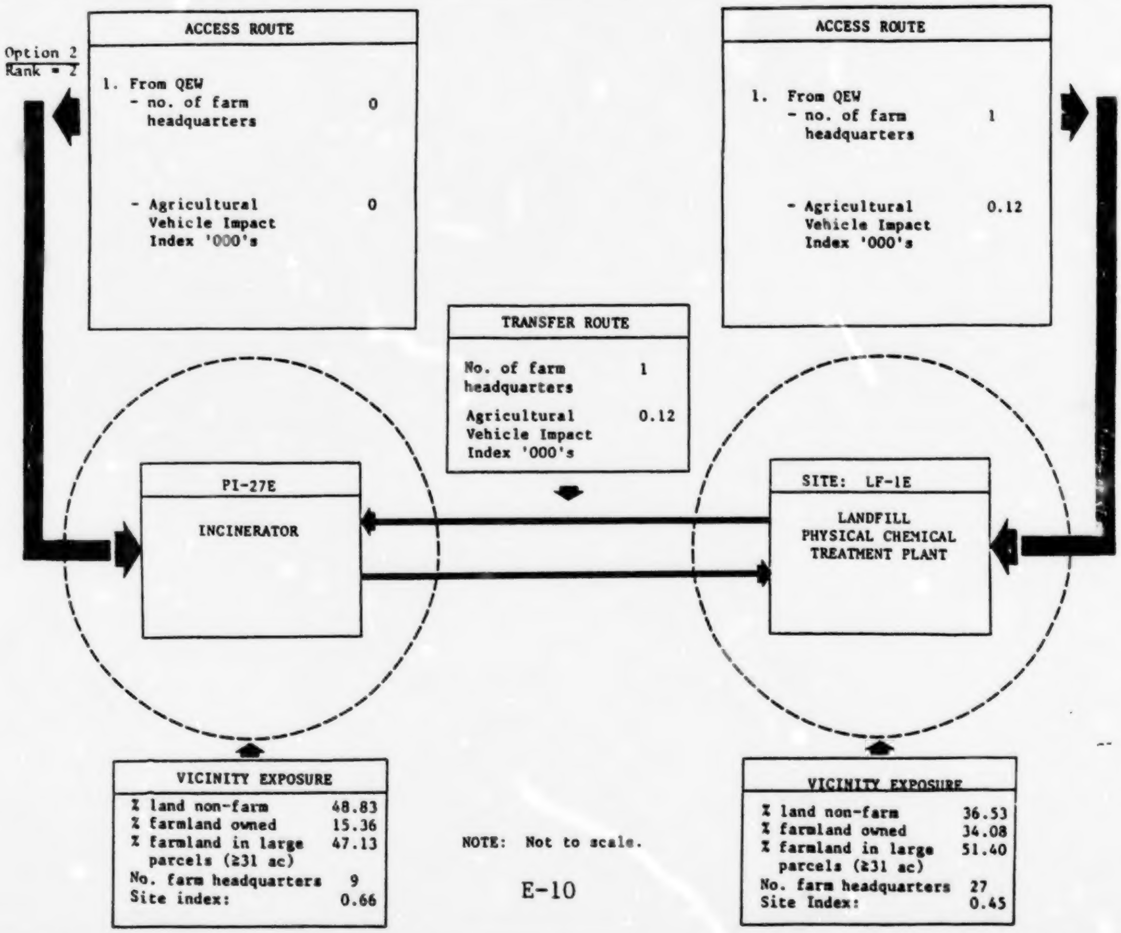
No. of farm headquarters 1

Agricultural Vehicle Impact Index '000's 0.12

VICINITY EXPOSURE

% land non-farm	48.83
% farmland owned	15.36
% farmland in parcels (≥31 ac.)	47.13
No. farm headquarters	9
Site Index:	0.39

Option 2
Rank = 2


PI-27E
INCINERATOR
SITE: LF-1E
LANDFILL
PHYSICAL CHEMICAL
TREATMENT PLANT

ACCESS ROUTE

1. From QEW
   - no. of farm headquarters 0
   - Agricultural Vehicle Impact Index '000's 0

ACCESS ROUTE

1. From QEW
   - no. of farm headquarters 1
   - Agricultural Vehicle Impact Index '000's 0.12

TRANSFER ROUTE

No. of farm headquarters 1

Agricultural Vehicle Impact Index '000's 0.12

VICINITY EXPOSURE

% land non-farm	48.83
% farmland owned	15.36
% farmland in large parcels (≥31 ac)	47.13
No. farm headquarters	9
Site index:	0.66

VICINITY EXPOSURE

% land non-farm	36.53
% farmland owned	34.08
% farmland in large parcels (≥31 ac)	51.40
No. farm headquarters	27
Site Index:	0.45

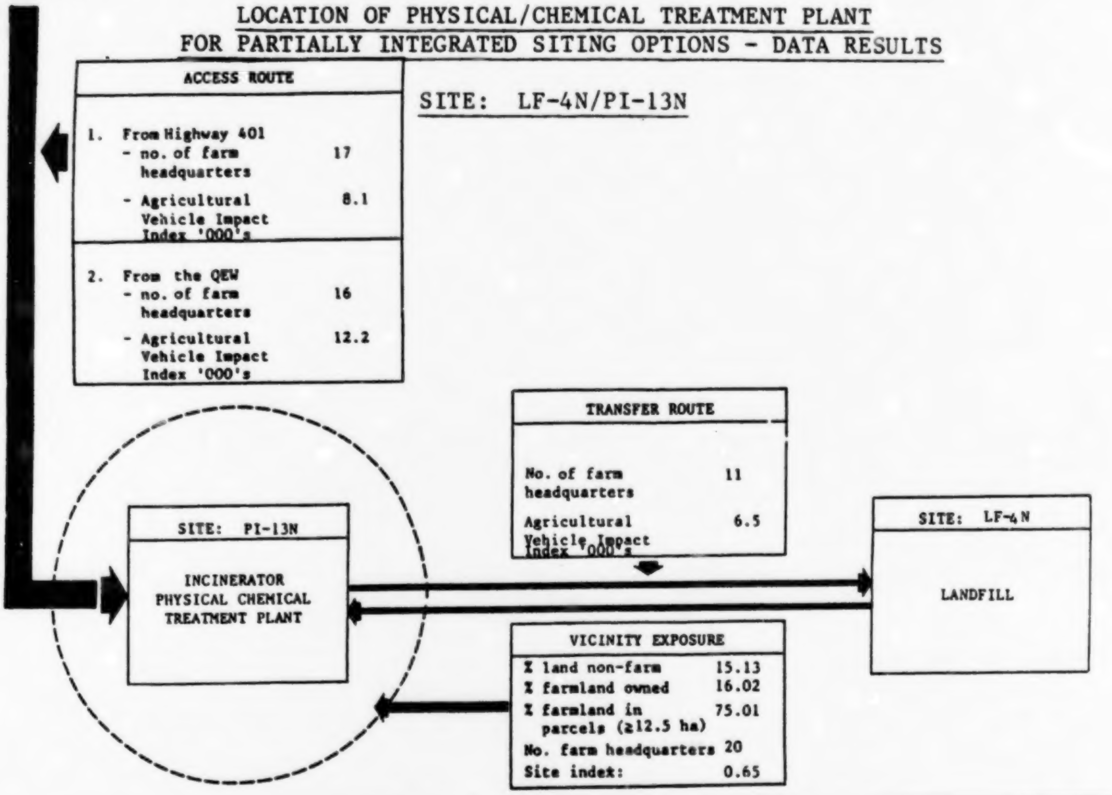
NOTE: Not to scale.

FIGURE E-1 - cont'd

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT FOR PARTIALLY INTEGRATED SITING OPTIONS - DATA RESULTS

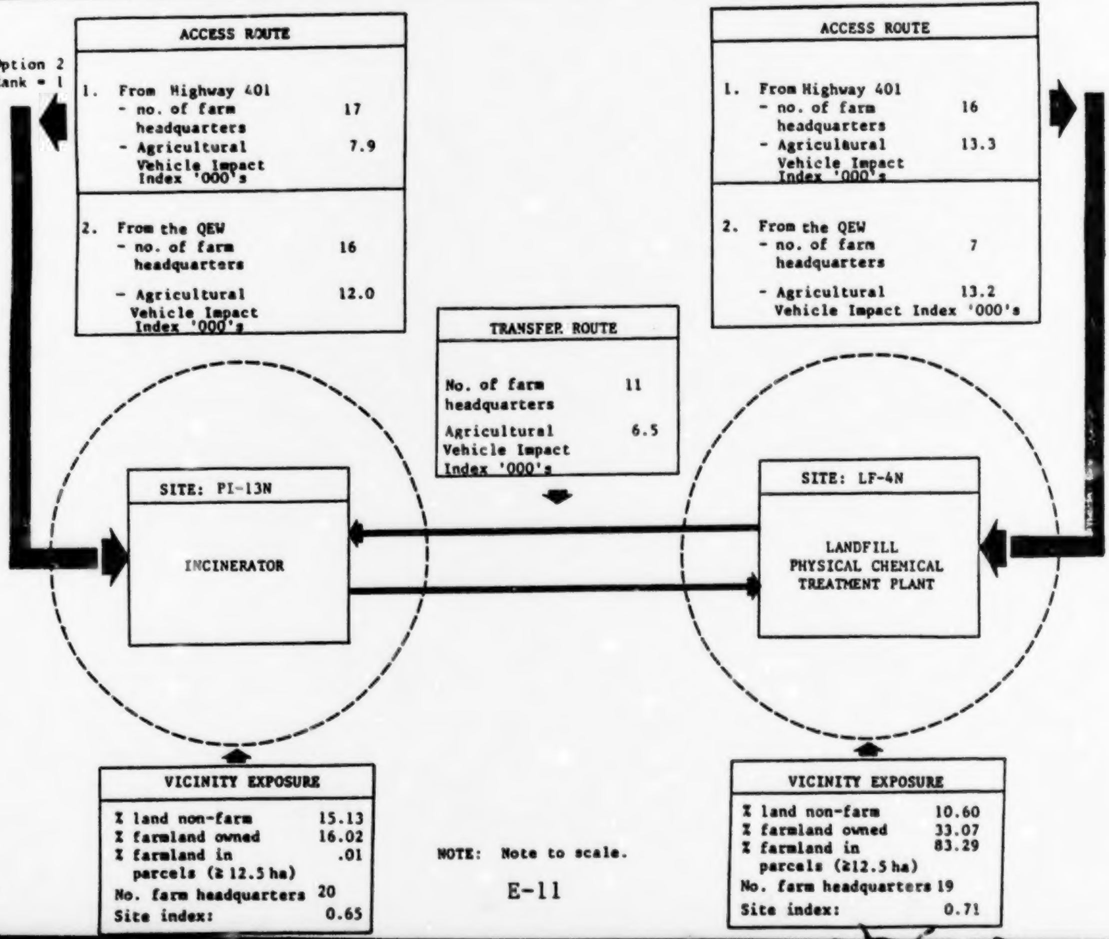
SITE: LF-4N/PI-13N

Option 1
Rank = 2



ACCESS ROUTE
1. From Highway 401
- no. of farm headquarters 17
- Agricultural Vehicle Impact Index '000's 8.1
2. From the QEW
- no. of farm headquarters 16
- Agricultural Vehicle Impact Index '000's 12.2
TRANSFER ROUTE
No. of farm headquarters 11
Agricultural Vehicle Impact Index '000's 6.5
SITE: PI-13N
INCINERATOR PHYSICAL CHEMICAL TREATMENT PLANT
SITE: LF-4N
LANDFILL
VICINITY EXPOSURE
% land non-farm 15.13
% farmland owned 16.02
% farmland in parcels (≥12.5 ha) 75.01
No. farm headquarters 20
Site index: 0.65

Option 2
Rank = 1



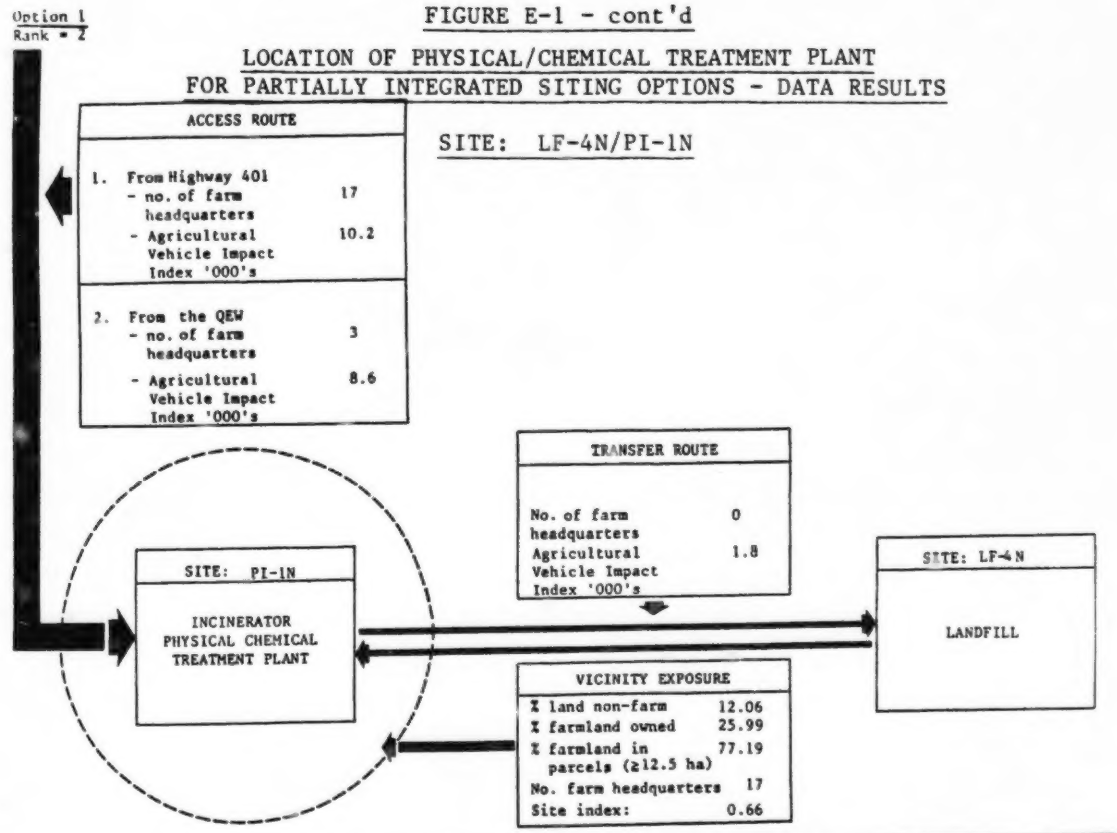
ACCESS ROUTE
1. From Highway 401
- no. of farm headquarters 17
- Agricultural Vehicle Impact Index '000's 7.9
2. From the QEW
- no. of farm headquarters 16
- Agricultural Vehicle Impact Index '000's 12.0
ACCESS ROUTE
1. From Highway 401
- no. of farm headquarters 16
- Agriculaural Vehicle Impact Index '000's 13.3
2. From the QEW
- no. of farm headquarters 7
- Agricultural Vehicle Impact Index '000's 13.2
TRANSFER ROUTE
No. of farm headquarters 11
Agricultural Vehicle Impact Index '000's 6.5
SITE: PI-13N
INCINERATOR
SITE: LF-4N
LANDFILL PHYSICAL CHEMICAL TREATMENT PLANT
VICINITY EXPOSURE
% land non-farm 15.13
% farmland owned 16.02
% farmland in parcels (≥ 12.5 ha) .01
No. farm headquarters 20
Site index: 0.65
VICINITY EXPOSURE
% land non-farm 10.60
% farmland owned 33.07
% farmland in parcels (≥12.5 ha) 83.29
No. farm headquarters 19
Site index: 0.71

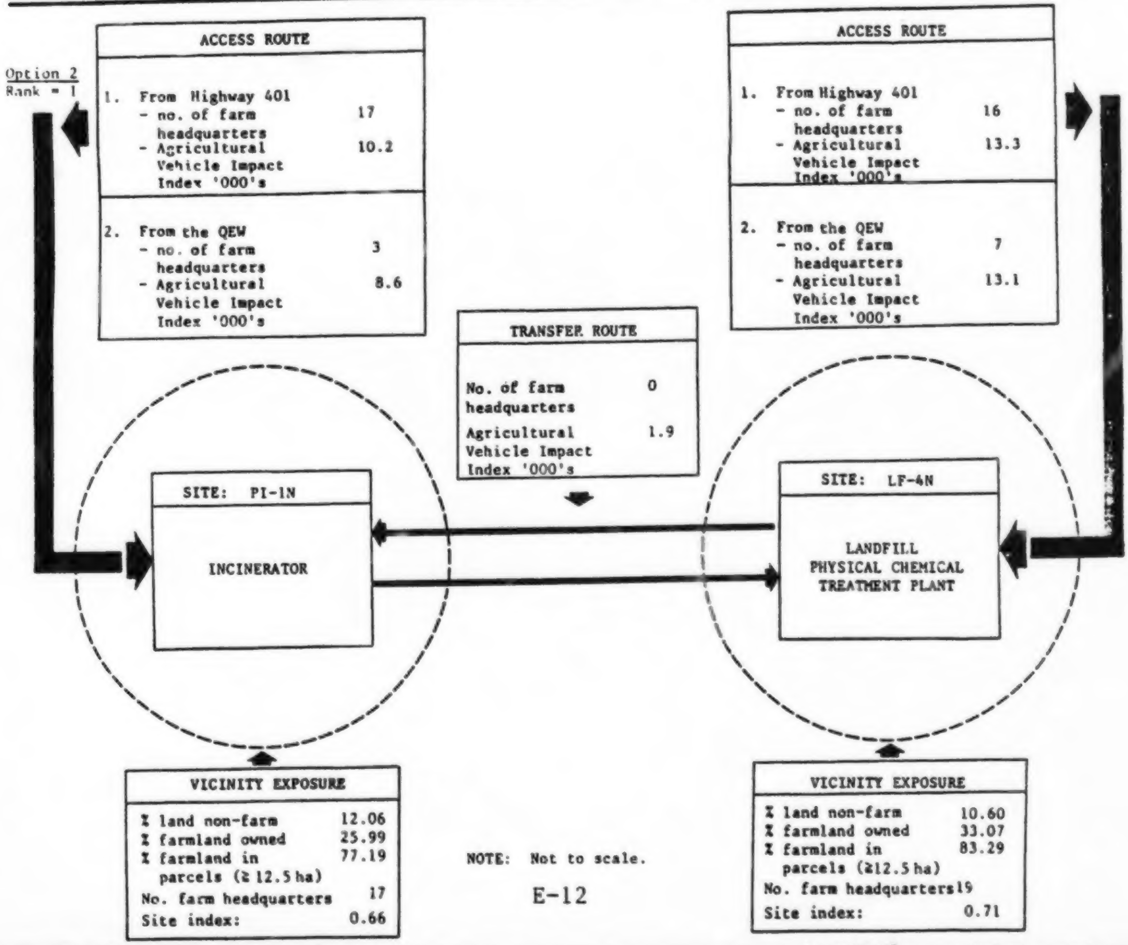
NOTE: Note to scale.

FIGURE E-1 - cont'd

LOCATION OF PHYSICAL/CHEMICAL TREATMENT PLANT
FOR PARTIALLY INTEGRATED SITING OPTIONS - DATA RESULTS

SITE: LF-4N/PI-1N


Option 1
Rank = 2
ACCESS ROUTE
1. From Highway 401
- no. of farm headquarters 17
- Agricultural Vehicle Impact Index '000's 10.2
2. From the QEW
- no. of farm headquarters 3
- Agricultural Vehicle Impact Index '000's 8.6
TRANSFER ROUTE
No. of farm headquarters 0
Agricultural Vehicle Impact Index '000's 1.8
SITE: PI-1N
INCINERATOR
PHYSICAL CHEMICAL
TREATMENT PLANT
SITE: LF-4N
LANDFILL
VICINITY EXPOSURE
% land non-farm 12.06
% farmland owned 25.99
% farmland in parcels (≥12.5 ha) 77.19
No. farm headquarters 17
Site index: 0.66


Option 2
Rank = 1
ACCESS ROUTE
1. From Highway 401
- no. of farm headquarters 17
- Agricultural Vehicle Impact Index '000's 10.2
2. From the QEW
- no. of farm headquarters 3
- Agricultural Vehicle Impact Index '000's 8.6
ACCESS ROUTE
1. From Highway 401
- no. of farm headquarters 16
- Agricultural Vehicle Impact Index '000's 13.3
2. From the QEW
- no. of farm headquarters 7
- Agricultural Vehicle Impact Index '000's 13.1
TRANSFER ROUTE
No. of farm headquarters 0
Agricultural Vehicle Impact Index '000's 1.9
SITE: PI-1N
INCINERATOR
SITE: LF-4N
LANDFILL
PHYSICAL CHEMICAL
TREATMENT PLANT
VICINITY EXPOSURE
% land non-farm 12.06
% farmland owned 25.99
% farmland in parcels (≥ 12.5 ha) 77.19
No. farm headquarters 17
Site index: 0.66
VICINITY EXPOSURE
% land non-farm 10.60
% farmland owned 33.07
% farmland in parcels (≥12.5 ha) 83.29
No. farm headquarters 19
Site index: 0.71

NOTE: Not to scale.

APPENDIX F

FACILITY CHARACTERISTICS

INTRODUCTION

Agricultural impacts, both on-site and off-site, will depend on specific design features of the proposed waste treatment facility. While engineering design is incomplete at this stage, a certain amount of preliminary design work is complete. This provides a set of information on facility characteristics which can be used in the evaluation of the potential agricultural impacts of candidate sites.

This appendix outlines the facility characteristics provided by O.W.M.C. and by Monenco Limited (1985) that are assumed for purposes of analysis in this report. These characteristics range from site locations through to assumptions regarding layout and design of treatment facilities. Description of characteristics of waste treatment facilities are limited to general characteristics which are applicable to any site location. The only exception to this are the site-specific details given in the section `site sizes.´

FACILITY LAYOUT AND DESIGN

There are three siting combinations of the treatment processes being considered by O.W.M.C. (Phase 3 Facilities Development Process Report, The Selection of Candidate Sites, March, 1984).

Case 1 - integrated: all treatment systems placed on one site.
Case 2 - partially integrated: incineration, physical/chemical treatment and solidification on one site; conventional landfill on a separate site.
Case 3 - partially integrated: incineration on a separate site, conventional landfill, physical/chemcial treatment and solidification on one site.

The Monenco (1985) report contains illustrations detailing the layout and perspective of one of the cases - the integrated facility. The size of the integrated sites being considered range from 135 to 273 ha with the central operating area requiring only 17 ha. These sizes include technical buffer zones of 50 metres from the outside perimeter of landfill cells and 400 metres from the point of emission of treatment facilities. This 400 metre buffer would be contained within the site acquisition area.

TYPE OF FACILITIES

Facilities that may be located at a waste treatment site range from the different treatment plants (physical/chemical, incinerator and solidification) to a variety of support facilities including administration offices, a car park, etc.

These facilities are industrial in nature and are thus assumed to be somewhat incompatible with agriculture as a land use. This is more the case with the treatment facilities and the incinerator than with the landfill facilities.

SITE SIZES

Site sizes for each candidate site are as follows:

LF-1E - 135 ha (LF-1E integrated - 273 ha)
PI-27E - 188 ha
LF-3C - 206 ha

LF-9C - 135 ha
LF-4N - 168 ha
PI-1N - 175 ha
PI-13N - 170 ha
LF-2N - 172 ha

Specific site sizes will reflect the above requirements as well as local constraints related to road and property alignments, flood plains, etc.

SURFACE DRAINAGE SYSTEMS AND LEACHATE COLLECTION

The quality of surface water runoff will be closely monitored. Potentially contaminated water from roads, storage areas and from active working areas of the landfill will be directed to holding ponds and then tested. If contaminated it will be sent to the physical/chemical plant for treatment. Any surface water of questionable quality will be tested and released to local watercourses only after the quality has been verified as acceptable. For further explanation refer to Monenco (1985).

Leachate will be collected from underdrains in the engineered landfill in a leachate collection pond and tested for acceptability for drainage. It not acceptable, it will be treated.

ON-SITE LAND USE

Prior to construction, existing on-site land uses would cease and site buildings would be removed. This condition is assumed to prevail through construction and operational phases, although compatible land uses could conceivably be allowed on lands not immediately required for facility operations.

OFF-SITE SERVICE REQUIREMENTS

Electric power, fuel and water are services required for operating the facility. The nearest suitable electric distribution line will provide electric power. If a reasonably accessible gas supply exists in the vicinity, it will be tapped to provide auxillary fuel for the incinerator. If natural gas is unavailable, diesel fuel will be the alternate fuel source.

Water supplies for the facility will be drawn from municipal supplies or from an adjacent body of water. Wherever possible, water demands will be minimized by using treated effluent. The intended use of the water will dictate the required quality of the water (Monenco, Status Report - Facility Design, April, 1985).

ACTIVITY LEVELS OF FACILITY OPERATIONS

Incinerator design capacity is assumed to be 30 000 tonnes per year (Monenco, Status Report - Facility Design, April, 1985). The normal incinerator operating schedule is 24 hours per day and seven days per week.

Assumed waste quantities for the total facility and the physical/chemical treatment plant are as follows:

	Waste Quantities (tonnes/year)		
Year of Operation	Total	Physical/Chemical	Shifts/Day Phys/Chem
1	50 000	30 000	1
2	70 000	50 000	1
3	105 000	80 000	2
4	130 000	100 000	2
5	150 000	120 000	3
6	180 000	144 000	3

Waste Quantities (tonnes/year)

Year of Operation	Total	Physical/Chemical	Shifts/Day Phys/Chem
7	210 000	168 000	2*
8	240 000	192 000	2
9	270 000	216 000	3
10	300 000	240 000	3
11	300 000	240 000	3

*(expanded capacity)

At an annual total facility waste stream of 300 000 tonnes, annual volume of landfill wastes would be 311,200 m3 (384,300 T) for total solidification. The landfill site would operate during daylight hours, but as the facility would approach maximum operating capacity, additional work shifts would be required.

TRUCK TRAFFIC VOLUMES

For partial solidification, truck traffic volume to the facility could be 79 vehicles per day for the trucking of special wastes to the facility. Trucking of chemicals and reagents to the facility could involve another five trucks per day. In addition, daily truck trips from the solidification plant to the landfill area would amount to 27 trips. For an integrated site, these trips would be on internal site roads. Otherwise, they could be on local and regional roads. Facility traffic will be limited to daylight hours (7 a.m. to 5 p.m.) on a five day, Monday to Friday schedule.

For total solidification the total number of vehicles per day each way would be 100.

EMPLOYMENT

Given the 300,000 tonnes per annum waste treatment scenario, the following on-site employment levels are being projected:

a) integrated site - 221

b) partially integrated (separate landfill) - 217

c) partially integrated (separate incinerator) - 231

ACCESS ROUTES

For each site, preferred access routes are identified. These extend from the site entrance to the first major (limited access) highway. In addition, certain sites also have rail access. Rail access and local road improvements may remove land and buildings from agricultural uses. All access roads will be upgraded to provincial standards. Rail access will occupy an 18.3 metre right-of-way.

ATMOSPHERIC EMISSIONS

Atmospheric emissions include incinerator stack emissions and fugitive emissions.

Incinerator stack emissions will be combustion products from the kiln that have passed through a flue gas scrubber. A stack height of 60 metres is used in the calculation of crop and livestock exposure indices.

Fugitive emissions will originate from a variety of ground level sources on site. They could include losses during material loading/unloading, kiln feeding, storage, transfer to landfill areas, etc.

The Monenco (1985) Report lists some typical flue gas emissions, the maximum emissions expected from the O.W.M.C. stack and the Ontario Ministry of the Environment emissions standards that have been established. Due to the preliminary nature of this list, site screening analysis for the purposes of this report will be based on the unit emission of an unspecified conservative constituent and resulting average annual or average seasonal ground level concentrations within an air dispersion zone about each site.

APPENDIX G

CALCULATIONS OF FACTOR SUITABILITY LEVELS AND FACTOR SCORES FOR SITING OPTIONS

This Appendix describes the mathematical techniques used to establish factor suitability levels and to score the siting options.

The procedures to determine factor suitability levels and factor scores involved several steps; these and examples of each are outlined below.

a) Scaling of Values -

The data for indicators and sub-indicators for each siting option served as inputs to the calculations (see Table 6-5, Chapter 6).

The scaling system was applied to the data on the matrix. The numbers were converted from absolute numbers to an index ranging from 0 to 100. Scaling was accomplished as follows: the highest data value across the siting options for one indicator (or sub-indicator) was assigned a value of 100, all other data values were shown as a percent of the highest value.

Once all values had been scaled, the scales were used to calculate indicator and sub-indicator scores.

b) Indicator Scoring -

The score of an indicator with no sub-indicators was calculated as follows: indicator weight x scaled value.

Example:

Indicator	Sub-indicator	Weight	Scaled Value	Indicator Score
soil capability	- - -	5	34.5	172.5

$$\text{indicator score} = 5 \times 34.5 = 172.5$$

The score of an indicator with sub-indicators was calculated as follows:

$$\frac{\Sigma\,(\text{sub-indicator weight} \times \text{sub-indicators scale})}{\Sigma\,\text{sub-indicator weights}} \times \text{indicator weight}$$

Example:

Indicator	Sub-indicator	Weight	Scaled Value	Indicator Score
proportion of land base lost		5	- -	417.5
	- owned	3	100	- -
	- rented	1	34.0	- -

$$\text{indicator score} = \frac{(3 \times 100) + (1 \times 34.0)}{3 + 1} \times 5 = 417.5$$

c) Factor suitability level -

The calculation of factor suitability levels was designed to provide a value consistent with the 0-5 range of suitability levels used by other site selection consultants.

$$\text{The factor suitability level} = \frac{\Sigma\,\text{indicator scores}}{\text{max. total indicator score}} \div 5$$

The maximum total indicator score is found by looking across all siting options to determine the highest indicator total.

Example:

Factor	Indicator	Indicator Score	Factor Suitability Level
Disruption of Adjacent Farm Operations	- no. of farms with headquarters	187.5	2.1
	- no. of operators with owned land	182.0	
	- livestock density (no. per ha)	78.0	
		447.5	

$$\text{factor suitability level} = \frac{447.5}{1041} \div 5 = 2.1$$

where, 1041 is the maximum Σ indicator scores among the siting options.

d) **Factor Score** -

The factor score was calculated as follows:

factor weight x factor suitability level

Example:

Factor	Factor Weight	Factor Suitability Level	Factor Score
Loss of Farmland	3	1.7	5.1

$$\text{factor score} = 3 \times 1.7 = 5.1$$

e) **Siting Option Score** -

The final score for each siting option was determined as follows:

$$\text{siting option score} = \Sigma \text{ factor scores}$$

Table G-1, Scoring of Siting Options, shows the scaling and scoring of factors, indicators and sub-indicators using the above procedure for each of the siting options.

f) Scaling of Siting Option Scores -

For the purpose of presenting the comparative ranking of siting options in Chapter 6, the siting option scores were also scaled. The procedure again gave the highest option score a value of 100 and other option scores were shown as a percent of the highest score.

TABLE G-1

FACTOR SCORES

STUDY AREA / FACTOR / INDICATOR / SUB-INDICATOR	WEIGHTS F	I	S	SITE: LF-1E SCALE	SCORE: S-I	I	F	SITE: LF-1E/PI-27E SCALE	SCORE: S-I	I	F
SITE:											
- Displacement of Farms with On-Site H.Q.	3						11.8				8.6
- No. of farm operations		5				375.0				266.3	
- owned			3	100.0	300.0			71.0	213.0		
- rented			1	0.0	0.0			0.0	0.0		
- Ave farm size (ha)		5				101.3				82.5	
- owned			3	27.0	81.0			22.0	66.0		
- rented			1	0.0	0.0			0.0	0.0		
- Gross farm revenue ($ 000's)		4		21.0		84.0		15.0		60.0	
Indicator Total						560.3				408.8	
Factor Suitability Level						3.9				2.9	
- Loss of Farmland	3						10.1				5.2
- Soil capability (Class 1 equiv.)		5		67.0		335.0		34.5		172.5	
- Tile drainage (ha)		3		0.0		0.0		0.0		0.0	
Indicator Total						335.0				172.5	
Factor Suitability Level						3.4				1.7	
FACTOR TOTAL							21.8				13.8
VICINITY:											
- Partial Displ.(off-site farms w on-site lands)	4						17.3				14.2
- No. of farms with headquarters		4		40.0		160.0		40.0		160.0	
- Parcel size (ha)		3		25.0		75.0		16.5		49.5	
- Proportion of land base lost (%)		5				391.3				305.0	
- owned			3	71.0	213.0			71.0	213.0		
- rented			1	100.0	100.0			31.0	31.0		
Indicator Total						626.3				514.5	
Factor Suitability Level						4.3				3.6	
- Disruption of Adjacent Farm Operations	5						10.5				15.2
- No. of farms with headquarters		5		37.5		187.5		50.0		250.0	
- No. of operators with owned land		4		45.5		182.0		64.0		256.0	
- Livestock density (# per ha)		3		23.0		69.0		42.0		126.0	
Indicator Total						438.5				632.0	
Factor Suitability Level						2.1				3.0	
- Disruption of Non-Adjacent Operations	4						11.7				9.6
- No. of farms with headquarters		5		72.0		360.0		72.0		360.0	
- Prop. of non-adjacent vicinity in crops(%)		4		58.0		232.0		31.0		124.0	
- Livestock density (# per ha)		3		10.0		30.0		8.0		24.0	
Indicator Total						622.0				508.0	
Factor Suitability Level						2.9				2.4	
FACTOR TOTAL							39.6				39.0
COMMUNITY:											
- Stability of Farm Population	5						13.2				13.0
- Operator age (% < 55)		3		87.0		261.0		85.0		255.0	
- Full time operators (% of total operators)		4		27.0		108.0		27.0		108.0	
Indicator Total						369.0				363.0	
Factor Suitability Level						2.6				2.6	

TABLE G-1 - cont'd

FACTOR SCORES

STUDY AREA / FACTOR / INDICATOR / SUB-INDICATOR	WEIGHTS F	I	S	SITE: LF-1E SCALE SCORE:	S-I	I	F	SITE: LF-1E/PI-27E SCALE SCORE:	S-I	I	F
- Stability of Agricultual Land Base	4						13.5				11.1
- Tenure		5				277.0				218.0	
- lge parcels (% land in pcls > 12.6 ha)			1	58.0	58.0			56.0	56.0		
- owned farmland (% of total)			3	51.0	153.0			36.0	108.0		
- area farmed (% of total)			1	66.0	66.0			54.0	54.0		
- Farm residences as a % of total residences		4		29.0		116.0		26.0		104.0	
- Ag. designated land (Class 1 equiv.)		4		83.0		332.0		57.0		228.0	
- Private land ownership (% of total)		3		99.0		297.0		97.0		291.0	
Indicator Total						1022.0				841.0	
Factor Suitability Level						3.4				2.8	
FACTOR TOTAL							26.7				24.1
REGION:											
- Disruption to the Farm Economy	4						5.9				5.4
- Gross farm revenue ($ M, 1981)		5		12.0		60.0		15.0		75.0	
- Relative exposure to fugitive emissions		4				26.0				4.0	
- livestock index			1	10.0	10.0			2.0	2.0		
- crop index			1	3.0	3.0			0.0	0.0		
- Relative exposure to stack emissions		3				78.0				64.5	
- livestock index			1	24.0	24.0			18.0	18.0		
- crop index			1	28.0	28.0			25.0	25.0		
- Downstream livestock		3		27.0		81.0		27.0		81.0	
Indicator Total						245.0				224.5	
Factor Suitability Level						1.5				1.3	
FACTOR TOTAL							5.9				5.4
ACCESS ROADS:											
- Disruption to Farm Traffic & Cattle Crossings	4						0.1				0.1
- Local roads		5				3.3				3.3	
- agricultual vehicle impact index			3	1.3	3.9			1.3	3.9		
- no. customer stops ('000)			2	0.0	0.0			0.0	0.0		
- cattle crossings			1	0.0	0.0			0.0	0.0		
- Regional roads		3				.0				0.0	
- agricultual vehicle impact index			3	.0	0.1			0.0	0.0		
- no. customer stops ('000)			2	0.0	0.0			0.0	0.0		
- cattle crossings			1	0.0	0.0			0.0	0.0		
Indicator Total						3.3				3.3	
Factor Suitability Level						.0				.0	
- Disruption to Crop & Livestock Production	2						0.3				0.3
- Adjacent crops (ha)		3		9.0		27.0		11.0		33.0	
- Adjacent livestock (# of animal units)		4		1.0		4.0		0.0		0.0	
- Downstream livestock		5		0.0		0.0		0.0		0.0	
Indicator Total						31.0				33.0	
Factor Suitability Level						0.1				0.1	
FACTOR TOTAL							0.4				0.4
INDICATOR AND FACTOR TOTALS						4252.3	94.3			3700.5	82.6

TABLE G-1 - cont'd

FACTOR SCORES

STUDY AREA / FACTOR / INDICATOR / SUB-INDICATOR	WEIGHTS F	I	S	SITE: LF-9C SCALE SCORE:	S-I	I	F	SITE: LF-3C SCALE SCORE:	S-I	I	F
SITE:											
- Displacement of Farms with On-Site H.Q.	3						7.7				14.8
- No. of farm operations		5				106.9				106.9	
- owned			3	28.5	85.5			28.5	85.5		
- rented			1	0.0	0.0			0.0	0.0		
- Ave farm size (ha)		5				138.8				243.8	
- owned			3	37.0	111.0			65.0	195.0		
- rented			1	0.0	0.0			0.0	0.0		
- Gross farm revenue ($ 000's)		4		30.0		120.0		88.0		352.0	
Indicator Total						365.6				702.6	
Factor Suitability Level						2.6				4.9	
- Loss of Farmland	3						7.0				11.4
- Soil capability (Class 1 equiv.)		5		34.0		170.0		51.0		255.0	
- Tile drainage (ha)		3		21.0		63.0		42.0		126.0	
Indicator Total						233.0				381.0	
Factor Suitability Level						2.3				3.8	
FACTOR TOTAL							14.7				26.2
VICINITY:											
- Partial Displ.(off-site farms w on-site lands)	4						9.1				20.0
- No. of farms with headquarters		4		20.0		80.0		60.0		240.0	
- Parcel size (ha)		3		25.3		75.9		59.5		178.5	
- Proportion of land base lost (%)		5				172.5				305.0	
- owned			3	46.0	138.0			51.0	153.0		
- rented			1	0.0	0.0			91.0	91.0		
Indicator Total						328.4				723.5	
Factor Suitability Level						2.3				5.0	
- Disruption of Adjacent Farm Operations	5						23.2				18.3
- No. of farms with headquarters		5		75.0		375.0		62.5		312.5	
- No. of operators with owned land		4		73.0		292.0		91.0		364.0	
- Livestock density (# per ha)		3		100.0		300.0		28.0		84.0	
Indicator Total						967.0				760.5	
Factor Suitability Level						4.6				3.7	
- Disruption of Non-Adjacent Operations	4						20.0				18.5
- No. of farms with headquarters		5		72.0		360.0		100.0		500.0	
- Prop. of non-adjacent vicinity in crops(%)		4		100.0		400.0		86.0		344.0	
- Livestock density (# per ha)		3		100.0		300.0		45.0		135.0	
Indicator Total						1060.0				979.0	
Factor Suitability Level						5.0				4.6	
FACTOR TOTAL							52.3				56.7
COMMUNITY:											
- Stability of Farm Population	5						25.0				23.1
- Operator age (% < 55)		3		100.0		300.0		100.0		300.0	
- Full time operators (% of total operators)		4		100.0		400.0		87.0		348.0	
Indicator Total						700.0				648.0	
Factor Suitability Level						5.0				4.6	

TABLE G-1 - cont'd

FACTOR SCORES

STUDY AREA / FACTOR / INDICATOR / SUB-INDICATOR	WEIGHTS F	I	S	SITE: LF-9C SCALE SCORE:	S-I	I	F	SITE: LF-3C SCALE SCORE:	S-I	I	F
- Stability of Agricultual Land Base	4						20.0				17.7
- Tenure		5				500.0				478.0	
- lge parcels (% land in pcls > 12.6 ha)			1	100.0	100.0			90.0	90.0		
- owned farmland (% of total)			3	100.0	300.0			97.0	291.0		
- area farmed (% of total)			1	100.0	100.0			97.0	97.0		
- Farm residences as a % of total residences		4		100.0		400.0		62.0		248.0	
- Ag. designated land (Class 1 equiv.)		4		79.0		316.0		80.0		320.0	
- Private land ownership (% of total)		3		100.0		300.0		98.0		294.0	
Indicator Total						1516.0				1340.0	
Factor Suitability Level						5.0				4.4	
FACTOR TOTAL							45.0				40.8
REGION:											
- Disruption to the Farm Economy	4						19.5				18.1
- Gross farm revenue ($ M, 1981)		5		53.0		265.0		42.0		210.0	
- Relative exposure to fugitive emissions		4				66.0				28.0	
- livestock index			1	31.0	31.0			13.0	13.0		
- crop index			1	2.0	2.0			1.0	1.0		
- Relative exposure to stack emissions		3				264.0				217.5	
- livestock index			1	76.0	76.0			100.0	100.0		
- crop index			1	100.0	100.0			45.0	45.0		
- Downstream livestock		3		73.0		219.0		100.0		300.0	
Indicator Total						814.0				755.5	
Factor Suitability Level						4.9				4.5	
FACTOR TOTAL							19.5				18.1
ACCESS ROADS:											
- Disruption to Farm Traffic & Cattle Crossings	4						6.2				20.0
- Local roads		5				0.0				270.8	
- agricultual vehicle impact index			3	0.0	0.0			75.0	225.0		
- no. customer stops ('000)			2	0.0	0.0			0.0	0.0		
- cattle crossings			1	0.0	0.0			100.0	100.0		
- Regional roads		3				160.5				250.0	
- agricultual vehicle impact index			3	43.0	129.0			100.0	300.0		
- no. customer stops ('000)			2	96.0	192.0			100.0	200.0		
- cattle crossings			1	0.0	0.0			0.0	0.0		
Indicator Total						160.5				520.8	
Factor Suitability Level						1.5				5.0	
- Disruption to Crop & Livestock Production	2						5.2				10.0
- Adjacent crops (ha)		3		66.0		198.0		100.0		300.0	
- Adjacent livestock (# of animal units)		4		22.0		88.0		100.0		400.0	
- Downstream livestock		5		67.0		335.0		100.0		500.0	
Indicator Total						621.0				1200.0	
Factor Suitability Level						2.6				5.0	
FACTOR TOTAL							11.3				30.0
INDICATOR AND FACTOR TOTALS						6765.5	142.8			8011.0	171.8

TABLE G-1 - cont'd

FACTOR SCORES

STUDY AREA / FACTOR / INDICATOR / SUB-INDICATOR	WEIGHTS F	WEIGHTS I	WEIGHTS S	SITE: LF-4N/PI-1N SCALE SCORE:	S-I	I	F	SITE: LF-4N/PI-13N SCALE SCORE:	S-I	I	F
SITE:											
- Displacement of Farms with On-Site H.Q.	3						6.8				15.0
- No. of farm operations		5				106.9				142.5	
- owned			3	28.5	85.5			28.5	85.5		
- rented			1	0.0	0.0			28.5	28.5		
- Ave farm size (ha)		5				45.0				170.0	
- owned			3	12.0	36.0			12.0	36.0		
- rented			1	0.0	0.0			100.0	100.0		
- Gross farm revenue ($ 000's)		4		43.0		172.0		100.0		400.0	
Indicator Total						323.9				712.5	
Factor Suitability Level						2.3				5.0	
- Loss of Farmland	3						15.0				14.8
- Soil capability (Class 1 equiv.)		5		100.0		500.0		98.9		494.5	
- Tile drainage (ha)		3		0.0		0.0		0.0		0.0	
Indicator Total						500.0				494.5	
Factor Suitability Level						5.0				4.9	
FACTOR TOTAL							21.8				29.8
VICINITY:											
- Partial Displ.(off-site farms w on-site lands)	4						17.8				12.0
- No. of farms with headquarters		4		100.0		400.0		20.0		80.0	
- Parcel size (ha)		3		63.3		189.9		100.0		300.0	
- Proportion of land base lost (%)		5				53.8				53.8	
- owned			3	0.0	0.0			0.0	0.0		
- rented			1	43.0	43.0			43.0	43.0		
Indicator Total						643.7				433.8	
Factor Suitability Level						4.4				3.0	
- Disruption of Adjacent Farm Operations	5						17.0				25.0
- No. of farms with headquarters		5		62.5		312.5		100.0		500.0	
- No. of operators with owned land		4		73.0		292.0		100.0		400.0	
- Livestock density (# per ha)		3		35.0		105.0		47.0		141.0	
Indicator Total						709.5				1041.0	
Factor Suitability Level						3.4				5.0	
- Disruption of Non-Adjacent Operations	4						12.8				13.2
- No. of farms with headquarters		5		50.0		250.0		59.0		295.0	
- Prop. of non-adjacent vicinity in crops(%)		4		94.0		376.0		93.0		372.0	
- Livestock density (# per ha)		3		18.0		54.0		11.0		33.0	
Indicator Total						680.0				700.0	
Factor Suitability Level						3.2				3.3	
FACTOR TOTAL							47.7				50.2
COMMUNITY:											
- Stability of Farm Population	5						22.2				20.0
- Operator age (% < 55)		3		83.0		249.0		77.0		231.0	
- Full time operators (% of total operators)		4		93.0		372.0		82.0		328.0	
Indicator Total						621.0				559.0	
Factor Suitability Level						4.4				4.0	

TABLE G-1 – cont'd

FACTOR SCORES

	WEIGHTS			SITE: LF-4N/PI-1N				SITE: LF-4N/PI-13N			
STUDY AREA / FACTOR / INDICATOR / SUB-INDICATOR	F	I	S	SCALE SCORE:	S-I	I	F	SCALE SCORE:	S-I	I	F
- Stability of Agricultual Land Base	4						16.3				14.8
- Tenure		5				311.0				290.0	
- lge parcels (% land in pcls > 12.6 ha)			1	90.0	90.0			89.0	89.0		
- owned farmland (% of total)			3	42.0	126.0			36.0	108.0		
- area farmed (% of total)			1	95.0	95.0			93.0	93.0		
- Farm residences as a % of total residences		4		57.0		228.0		48.0		192.0	
- Ag. designated land (Class 1 equiv.)		4		100.0		400.0		94.0		376.0	
- Private land ownership (% of total)		3		100.0		300.0		88.0		264.0	
Indicator Total						1239.0				1122.0	
Factor Suitability Level						4.1				3.7	
FACTOR TOTAL							38.5				34.8
REGION:											
- Disruption to the Farm Economy	4						14.2				20.0
- Gross farm revenue ($ M, 1981)		5		39.0		195.0		100.0		500.0	
- Relative exposure to fugitive emissions		4				292.0				256.0	
- livestock index			1	100.0	100.0			28.0	28.0		
- crop index			1	46.0	46.0			100.0	100.0		
- Relative exposure to stack emissions		3				52.5				54.0	
- livestock index			1	19.0	19.0			19.0	19.0		
- crop index			1	16.0	16.0			17.0	17.0		
- Downstream livestock		3		18.0		54.0		9.0		27.0	
Indicator Total						593.5				837.0	
Factor Suitability Level						3.5				5.0	
FACTOR TOTAL							14.2				20.0
ACCESS ROADS:											
- Disruption to Farm Traffic & Cattle Crossings	4						12.1				17.3
- Local roads		5				281.7				418.3	
- agricultual vehicle impact index			3	82.0	246.0			100.0	300.0		
- no. customer stops ('000)			2	45.0	90.0			100.0	200.0		
- cattle crossings			1	2.0	2.0			2.0	2.0		
- Regional roads		3				34.0				33.0	
- agricultual vehicle impact index			3	12.0	36.0			12.0	36.0		
- no. customer stops ('000)			2	16.0	32.0			15.0	30.0		
- cattle crossings			1	0.0	0.0			0.0	0.0		
Indicator Total						315.7				451.3	
Factor Suitability Level						3.0				4.3	
- Disruption to Crop & Livestock Production	2						2.8				3.4
- Adjacent crops (ha)		3		72.0		216.0		98.0		294.0	
- Adjacent livestock (# of animal units)		4		11.0		44.0		17.0		68.0	
- Downstream livestock		5		15.0		75.0		10.0		50.0	
Indicator Total						335.0				412.0	
Factor Suitability Level						1.4				1.7	
FACTOR TOTAL							14.9				20.8
INDICATOR AND FACTOR TOTALS						5961.2	137.1			6763.1	155.6

APPENDIX H

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